Nature Magazine

VOLUME 34 NUMBER 8

OCTOBER 1941

35 CENTS

Pep Up Your Meetings

Motion pictures of Nature and the Outdoors will take you far and wide in the world of the wild.

Schools; Garden Clubs; Women's Clubs; Nature and Hiking Clubs; Boy and Girl Scout Troops; Church, Civic and Fraternal Organizations; Sportsman and Conservation Groups will be interested in these motion picture films. Thrilling, educational motion pictures help to boost attendance at meetings. They make meetings more interesting and help to promote some educational activities by increasing a knowledge of Nature and the outdoors; developing a consciousness of the need for practical conservation of our national resources and the protection of wildlife.

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11. *Babes in the Woods:* The life of Nature's young in the wild.
12. *Wild Animal Pets:* A naturalist's dog into whose life came many strange animals.
13. *Renting Houses for Songs:* An intimate study of bird life.

GROUP II: A spectacular series of Alaskan reels.

21. *Cruising North:* Murres, sea puffins, bear and other coastal wildlife.
22. *Off to Glacier Bay:* Spectacular pictures of the face of a glacier breaking off and plunging into the bay. Also wildlife scenes.
23. *Wild Animal Outposts:* Hardy Island deer, ptarmigan, bear cubs, blue fox, fur seals of the Pribilofs.
24. *Thar She Blows:* Whales at sea.
25. *Great Bear of Alaska:* Films of the great Kodiak bears of Admiralty Island.

GROUP III: Southwestern series.

31. *Wings to the South:* Bird life of the Texas Gulf coast and the southwest.
32. *Riding the Rimrock:* Searching the rough country of the southwest for its wildlife.
33. *Nature's Side Show:* The struggle for existence in the arid southwest.
34. *Queer Creatures of the Cactus Country:* A study in the adaptation of wildlife to a harsh land.
35. *Getting Personal with Mountain Lions:* A thrilling picture of a pack trip into lion country.

GROUP IV: Photographed along the Continental Divide.

41. *The Big Game Parade:* You meet Antelope, Mountain Sheep, Mule Deer, Elk, Bison, Moose, Brown Bears and Grizzlies.
42. *The Forests:* Forest Fires, Birds, Beaver—greatest conservationist of all—at work.
43. *When Mountains Call:* The life of the high places is thrilling to see. Water Ouzel, Ptarmigan, American Eagle, Big Horn Sheep, Wapiti—American cousin of the European Stag.
44. *Ramparts of the North:* Filming big game requires endurance. Glaciers, Hoary Marmot, Caribou, Moose, Black Bear.
45. *Getting Our Goat:* Mountain Goat on its native crags. Ground Squirrels, Cony, Grouse.

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Camera Trails

BY NORRIS W. HARKNESS

A JASPER NATIONAL PARK DEER—PHOTOGRAPHED BY ARTHUR E. EVANS, HARBERT, MICHIGAN

Shooting Animals

If you have an opportunity to visit a wildlife refuge, or one of the National Parks open in the fall, do not fail to take your camera along and be sure to use it on game. Perhaps your vacation for this year is over, but next year's is coming and it is not too early to begin planning for it right now. And if you can possibly arrange it, plan to visit a National Park, where the animals have not heard a rifle shot in years.

I went to Jasper National Park in western Canada with the *Popular Photography* Camera Tour. There, in addition to some of the world's most gorgeous scenery—which will make another story here later—I wandered through the woods looking for deer and bear. Near the lakes and ponds I tried to shoot beaver. And all of them were unbelievably tame. They are wild animals—not fed and tamed—but they have not been hunted in years and they have not been taught to be afraid of the strange human animal who rambles clumsily through their woods, stops a while near them, and then goes on his silly way without stopping to eat or enjoy himself as any sensible animal should.

But those of us who use ordinary cameras without telephoto lenses still need to use some sort of woodcraft. We need to consider the direction of the wind and move whenever we can against it to make our odor less obvious to our intended subject, and we need to move slowly but without too much of the attitude of stalking prey. The animals seem to sense our intensity and, if we approach them with a "do or die" feeling, they are likely to become frightened and slip away. If our feeling is that "we'd like permission to make your picture but if you refuse, we'll soon find another subject —it really is unimportant", the deer will often let us come to within twenty or thirty feet. After we know them better and learn that the head comes up right after the tail gives its signal and that snapped sticks are sure signs of danger, they may even permit closer approach. I made two shots of one doe from within ten feet before she decided I was getting too familiar and slowly walked off.

The main things to keep in mind are sudden sounds and movements. Either of them will frighten a deer, and most other animals, immediately, and a frightened deer is a poor camera subject. When you see one or two of them, do not freeze solid and then start to sneak up closer. A running conversation in as monotonous a tone as you can manage will do much to reassure the deer as to your desires. Then avoid stepping on dead sticks and do most of your moving while they are feeding. When the tail signals, stop and wait for the head to go down again, but keep on telling them how beautiful they are and how grand their picture is going to look. As soon as the picture seems possible, shoot it, and then try to get closer. Shoot again and again as the distance between you lessens until finally it suddenly increases fast and you are standing there alone hoping you have on the film all you might have caught.

But do not be in a hurry. Animals are accustomed to having friends proceed gently —it is only enemies who rush around, and you surely are no enemy. And another thing to implant firmly in your own mind—you are the intruder on property that has belonged to your temporary hosts for ages. It is up to you to act as a guest should and to realize that the animals have as great a privilege and as many rights as you. If you realize that and keep the thought that all is not lost if they get away before you can make your exposure, they will get that same feeling and let you do even better than you would think possible.

As for the camera technique, the only difficulty is the speed with which you must work. Carry the camera set and ready with the lens focused on about twenty feet. Set the exposure for your surroundings by meter or experience, but allow a shutter speed of $\frac{1}{100}$th second, or faster, to stop movement on the part of your possible subject or because of extra excitement on your own.

If you are especially lucky, you will run into someone as I did who really knows what is going on. I met Flight Lieutenant Harper Cory, naturalist and author of many Nature books, who is in Canada on military duty. We wandered miles through the Jasper woods and—well, I only wish you could have been there.

The Problem Corner

T.T., Chicago, Illinois, writes: "A recent magazine article mentions a 'neutral density filter' for use with a moving picture camera. What is it and how does it work?"

ANS.—A neutral density filter is a gray filter that reduces the amount of light entering the lens without affecting its color characteristics. Regular filters change the color of the light—that is their main purpose—while reducing its intensity to some extent, but the gray filter is used only to cut down the intensity. Placed over the lens, it enables the movie maker to use a larger stop and still get correct exposure with less depth of field than the smaller stop would give. This, of course, helps to eliminate bad backgrounds. The filter also permits correct exposure in extremely bright light—as at the beach or in snow—when the diaphragm cannot be closed far enough.

C.H.J., Lynchburg, Virginia, asks: "I e a meter to determine the printing time making enlargements, but I never get the me results twice. The meter is a good one d my dealer says it is in good order. What ght be the trouble?"

ANS.—An enlarging meter measures the ght falling on the printing paper, but to ve accurate results all the other conditions ust be the same. For instance, the temper- ure and strength of the developer must constant and there should be no varia- n in the electric supply. Developer tem- rature is the most frequent cause of diffi- lty and a thermometer ought to lie in the y all the time while you keep the tem- rature as uniform as you can. It should t vary more than a degree or two. Also, not put too many prints through the me solution. Each one takes out some of strength and the exposures and develop- g time will increase a little with each one less you have a fairly large quantity of de- loper in the tray.

G.L., Lexington, Kentucky, writes: "I ve put a light yellow gelatine filter in the ns of my Graflex. When I add a medium llow on the front of the lens, does the ter factor equal the sum of the two factors not? What happens when I put on a d filter?"

ANS.—Since the medium yellow filter is mply a stronger tone of the same color as e light yellow inside the lens, the right ctor for the two yellows is just a shade ore than for the medium alone. Its factor two with pan films, and you need not d more for the light one since the only ss it causes is a tiny fraction due to the ght loss of going through the extra film. ne color of the light one has no effect on e film when both filters are the same color. However, when the red or some other lor is used the problem becomes more mplicated and you must consider the rela- n between the colors of the filters. Red blue filters will theoretically pass no ght at all so the filter factor of the com- nation is infinity. The rule for using two fferent filters of different colors is to mul- ply the factors and use the product as the ctor for the exposure. A red one with a ctor of four and the light yellow whose ctor is one and one-half would then have combined factor of six.

H.N.A., Glens Falls, N. Y., asks: "How n I figure Kodachrome exposures with my eter in very bright light? The meter called r f/22 for my movie camera at 16 frames r second and I allowed f/16, but the films ere still a little underexposed."

ANS.—While the light may seem to call r less exposure, the minimum exposure at should be given Kodachrome in movies f/11 regardless of the apparent light. No ne seems able to explain the reason, but the ct remains that f/11 is the smallest stop at can be used successfully.

This and That

One of the most exciting announcements recent months is the Minicolor Print. The w prints are made by Eastman Kodak om your 35mm or Bantam Kodachromes, d are either 2¼ x 3¼, or slightly more an 5 x 7 inches, showing the entire Koda- rome. The base is a translucent white film d the colors of the reproduction are extremely close to those of the original transparency. The smaller Minicolor prints cost 75c each and the larger size $3.50.

For users of the professional cut Kodachrome Eastman has arranged the Katavachrome service that makes the same type of print in larger sizes with enlargements up to six diameters from all or part of the Kodachrome. Your dealer will send your Kodachromes to Rochester for you.

These services are going to add plenty to your enjoyment of Kodachrome for it will no longer be necessary to darken the room and set up screen and projector to show your color work. And speaking of color, this is the time to shoot the autumn foliage in all its reds and yellows. Take along a roll or two of color film the next time you are wandering through the country. Use it carefully in accordance with the instructions that come in the box and you will get a happy surprise.

Burke and James have brought out a new camera, the B. & J. Press Camera, that looks rather like a regular news camera and seems to be strongly made and good in every way. There is no focal plane shutter, but the bellows extension (14 inches) is long enough and it has a tilting front with a drop bed and all the adjustments you will need. Write to Burke and James, 223 West Madison Street, Chicago, for their booklet.

Wabash has brought out a new Blackout Flash Bulb that is used with infra-red film for invisible flash pictures. The bulbs have a dark coating on the outside that holds back all but a red glow when the bulb is fired but permits the passage of the infra-red rays. The bulbs work well but need rather large apertures if the distance from bulb to subject is more than ten feet. Full information on these and other Wabash bulbs may be obtained from Wabash Photolamp Corp., 345 Carol Street, Brooklyn, N. Y.

O.P.M. is probably not going to give photographic apparatus a high standing on the priorities list and the chances are that there will be a shortage of cameras and accessories before spring comes around again. So, if you are planning the purchase of new equipment, you had better decide on it in the near future. The authorities want to do all they can to keep our photographic ball rolling, but the demands of defense are taking much of the material generally used in our field.

The leaf burning season is a fine one for striking pictures, so when you find a man, or better still, a small boy, raking leaves into the bonfire, try your luck from various directions.

Camera Trails is conducted for the benefit of amateur photographers and operates a service to help you solve your photographic problems. The editor also will welcome any suggestion or criticism. Send your letter to Norris W. Harkness, NATURE MAGAZINE, 1214 16th Street, N. W., Washington, D. C.

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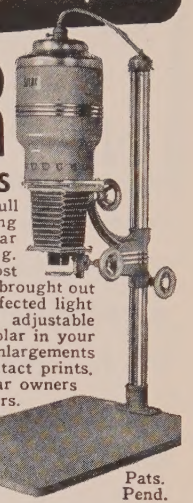

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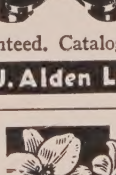

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TO THE EDITOR

Nature Songs

Dear Sir:

I was interested in the little song in the June issue, and also interested in E. J.'s comment in the August-September issue.

The magazine is written for adults, yes, I agree, it is largely. But adults are set in their ways of thinking, and the information they consume now is to strengthen their present knowledge.

But when the present adults are gone, the children of today will take their places, and such things as they learn today will be their knowledge tomorrow.

I have always enjoyed any junior articles, as I have enjoyed the whole magazine, and I think the junior articles also have a valuable place. If a child grows up on the reading and pictures of the magazine, will they not be the better tomorrow? And tomorrow we will need them more and more to have a thought for the wildlife that abounds in this country.

The adults of today can do much, and they must, but let us bring up our adults of tomorrow to a greater appreciation of the wonders that abound around us. Let us have more to interest them in the NATURE MAGAZINE.

MARY C. CLAPP

Abington, Mass.

Dear Sir:

As the mother of a subscriber of some years' standing I wish to tell you how delighted I am with your "new departure" in the form of a nature song. If you can find more songs as delightful as "If You Are a Rabbit", do let us have them.

Your magazine has meant a great deal to my naturalist son. Each year we ask him if he wouldn't rather have some sort of a book for Christmas, and we wonder if at seventeen he hasn't outgrown the publication, since he was just a youngster when we first started reading it. However, judging from the response to these queries, NATURE MAGAZINE must be of the "ageless" species!

ELSIE JARRETT

York Mills, Ontario.

Wars and Wars

Dear Sir:

We are in a midst of a great war. Why is it being fought? No one knows exactly why. That is the way of the wars of man—reasonless, senseless.

But, this war among men is not the only war that is being fought. Here in America, ever since the white man came, there has been a constant war—waged by the white man—against wildlife. Unnecessary killing, destroying, injuring, hurting the beautiful, natural things in this country.

Man sets a trap, or arms himself with an ax or a gun, and goes unafraid to slaughter his defenseless friends. Yes—friends, always helping and aiding man, yet killed through his ignorance and selfishness. And *this* is *sport.*

Man has slowly been awakening to this, but very slowly. Why don't all the true Conservationists and Nature Lovers get together and do something? There are so many wonderful articles in NATURE MAGAZINE, such as "The Wonder Dog," that I think if more people would read them, maybe they would be kinder to wildlife.

If the attitudes of some "sportsmen" would be changed, they could in turn change others.

BARBARA BEITZEL

Mechanicsburg, Pa.

Country Digest

The Country Book, a new digest magazine, issued as a quarterly, made its appearance in mid-summer. It carries the sub-title of "A Digest of Country Living . . . from the Country." It is edited by Erwin D. Swann and has business offices at 70 East 45th Street, New York City, which is no "country" unless it has changed vastly in the past couple of months. The articles, which are well and interestingly illustrated in many cases, present practical, inspirational or informational material for the country dweller. One interesting feature is inclusion of a digest of current Government Farm Bulletins.

Yosemite Indians

The July, 1941, issue of *Yosemite Nature Notes* departs from the purely natural history character customary to it and is entitled *Yosemite Indians, Yesterday and Today.* This 72-page, illustrated booklet, issued by the Yosemite Naturalist Department and the Yosemite Natural History Association, Yosemite National Park, California, is the work of Elizabeth H. Godfrey, secretary of the museum. It is a valuable contribution to literature of the Park and is available at the address above for twenty-five cents.

Nesting Material

Last October, reports Flora G. Lindsay of Crete, Nebraska, a friend was raking leaves near a barberry bush and noted a peculiar bird's nest in the bush. Recalling that a catbird had nested there she detached the nest. It yielded the answer to a question that had troubled her since May, when she had laid two lace collars on the grass to whiten after washing. These had disappeared mysteriously, and she now found the finer one woven in with other material to make the bowl of the nest, while the other was fastened as a sort of drapery around the edge. Mrs. Lindsay adds that this *dis*covery of the collars proved to be by no means a *re*covery of them.

Crater Lake

Crater Lake. By Howel Williams. Los Angeles. The University of California Press. 1941. 100 pages illustrated. $1.75.

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Nature in Print

By HOWARD ZAHNISER

BRUCE CALVERT found it so peaceful about his dwelling place in the woods in October of 1908 that he wondered: "Why will not tired and restless humanity leave the noisy, overcrowded, unwholesome city?" Of course the answer is "They will," and that willingness explains why some of them will enjoy reading Bruce Calvert's writings.

Actually I am not sure but that the cities themselves are pleasant enough in October to make possible a bit of even urban contentment. One of the quandaries of the month is whether to go away to find October at its best or to stay and enjoy the city at *its* best. Still, I have never known anyone who would not leave the city any time this might be possible, although it is true that there are many who are slow to get the vision of possibility. Those who are born into an urban civilization are inescapably there, some are more hedged about than others, and only a very few can declare independence and win the revolution that follows.

Bruce Calvert himself, I understand, was a "teacher, business executive, and advertising copy writer" during the forty-two years of his life that preceded the founding of his monthly journal called *The Open Road*—edited in his cabin—"Pigeon Roost in the Woods"—and devoted to making the world "safe for intelligence." During the rest of his life he made lecture tours and ministered in his own fashion to an earnest mail-order congregation of the "tired and restless humanity" that could not follow him literally, and now some of these have gathered the best of his writing into a volume. It is a book that includes many delightful descriptions of the outdoors in its seasons and of the birds, but one made up mainly of Calvert's caustic comments on the stupidities, with the remedies that he had discovered.

Such a book by a "nature-worshipper" and a crusading writer of paragraphs against noise, vulgarity, smugness, intolerance, and group compulsion is an excellent antidote to have on the shelf for incipient complacency. It appears, however, to be derivative rather than creative in its radical thinking and exemplifies a pattern of living that few can have the chance of following. For these reasons the book will probably change the lives of few moderns, but many will find good companionship in some of its pages and stimulus in others.

Calvert's sort of year-round departure from noise, crowds, and unwholesomeness can hardly give reasonable hopes to many of those who are jaded by the city, but it need not, of course, leave them hopeless. There do seem to be ways of reconciling the necessities—those for being of the city and those for being away from it. It is interesting, for example, to note that in the same year that Calvert was starting *The Open Road* the boys of the Vermont Academy Mountain Club began the blazing of a trail that over a period of years became a 260-mile "footpath in the wilderness." "The long trail in the Green Mountains of Vermont" stands for the sort of relief that is really proving to be effective.

Footpath in the Wilderness is a volume that so fittingly celebrates and describes this long trail that many will enjoy it even though they may never more than hope to hike along the path. An enthusiastic editor and eight writers, including a famous novelist and a United States Senator, have joined to produce one of the most valuable library supplements that one can imagine to the detailed guide book that all fortunate hikers carry. The novelist, Dorothy Canfield Fisher, discusses the hiker's philosophy; the senator, George D. Aiken, describes wildflowers and trees; and others discuss the history of the making of the trail, geology, wildlife, winter uses, hiking equipment, and a trip from "end to end."

"Being physically (not nervously) tired is one of the greatest luxuries a modern can have," says Dorothy Canfield Fisher, and to this luxury of the hiker she adds the privilege of doing things himself for himself, "independent self-directed use of the creative instinct." Yet she calls these "two joys" the smallest part of "the deep soul-renewing satisfaction of a weekend, a week, a fortnight in the woods." Her words ring true, and they make it apparent that there is more sanity in hoping for such renewal of vitality than for escape forever from the circumstances that jade. I daresay there is more opportunity for leaving the city effectively on the path between "an inconspicious wooden marker that pokes up undecidedly on the Massachusetts-Vermont stateline" and Line Post 592 on the United States-Canadian border than there is in a roost in the woods.

Fortunately, of course, the Green Mountains are not the only hills to which one can lift his eyes, and the long trail there is not the only footpath outside the city parks. Far to the south, Robert Sparks Walker, for example, has been leading groups over the paths of Lookout Mountain for more than three decades, and his admiration for this mountain has finally expressed itself in a truly excellent book. "Thirty years of reflections," he says, "have been thrown over a rocky sifter composed of thousands of footsteps, leading forward hundreds of miles."

Mr. Walker's volume, however, is not written solely for hikers, but rather for all who may have an interest in his mountain. This interest may be specialized in caves, in rock cities, in geology, waterfalls, flowers, battle grounds, transportation, or local history, but in any case Mr. Walker has something to satisfy it. In (Continued on page 470)

Books discussed in this article are:

Thirty Years on the Open Road with Bruce Calvert. Selected from writings first published in "The Open Road," over a period of more than thirty years. New York: Greenberg, Publisher, Inc. 1941. 280 pp., with a foreword by Benjamin de Casseres. $2.

Footpath in the Wilderness: The Long Trail in the Green Mountains of Vermont. Middlebury, Vt.: Middlebury College Press. 1941. 102 pp., with 100 photographs on 16 plates and a map. $2.50.

Lookout: The Story of a Mountain. By Robert Sparks Walker. Kingsport, Tenn.: Southern Publishers, Inc. 1941. 282 pp., with index, 2 endpaper maps, and 60 photographs on 31 plates. $2.

PHOTOGRAPH BY D. WARREN BOYER

Autumn

By PHILIP REISTER

Earth, I cannot endure the beauty
Of your autumn tone;
My quivering flesh, the surging blood,
The tautened bone
Press hard to leap this measured space,
And melt into their elemental own.

The blaze of crimson, umber, yellow chrome
That sweeps its splendor up the hill
And lights refrangent fires in the sky,
And valleys still,
Lays sting exquisite on my lips,
And smites me blind at will.

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With Fangs Withheld

Gentleness and understanding win friends of the feared

By TED IRWIN

POISONOUS animals in general, and venomous reptiles in particular, have acquired bad reputations. The cobra, the tarantula, the rattler, the gila monster, and their poison-bearing kindred, have long been counted Nature's bogy men. Whether this reputation is justified is a question few persons have the courage to investigate.

To say that these creatures are trustworthy may at least surprise the reader. Water moccasins trustworthy? Black widow spiders trustworthy? One needs proof of that! Indeed, there seems too much evidence to the contrary. Yet there is a woman who says that it is true, and after more than twenty years of experiment and research she grows more unshakable in her conviction each day.

She is Grace Olive Wiley, a woman of scientific training who had ample opportunity to investigate this field in the thirteen years she was curator of the Museum of the Minnesota Academy of the Minneapolis Public Library, and who continues her work now with her own small but unusual collection of animals, in North Long Beach, California.

Many people who have never heard of Grace Wiley have seen some of her animals in motion pictures. The cobras used in "Moon Over Burma" are hers, and were directed by her in the film. Audiences thought they were watching only one cobra "menacing" the blind plantation owner portrayed by Albert Basserman. In reality there were two Siamese cobras much alike in appearance, a pair named Ila and Indra, so tame and fat that the exertion of crawling about as much as the film demanded exhausted them by turns, and they were substituted one for the other while rest periods restored them.

These cobras are just as poisonous as when they crawled in the bush in Siam, and of course the proper precautions were taken to protect the actors. The only precautions Miss Wiley uses, however, are kindness, knowledge and courage. To feed them, she leans well into their cage and holds pieces of raw beef, covered with cod liver oil and bone meal, in short forceps with her unprotected hand. She pets them and gently chucks them in the ribs when she wants them to spread their hoods.

GRACE OLIVE WILEY AND KING COBRA
While being photographed the cobra was chiefly concerned lest he fall and sought the protection of his friend

To watch her work with all manner of toxic and deadly animals is proof of her certainty that they will not use their weapons when they are convinced that there is no need. Why bite a friend? Her plan boils down to convincing them that she *is* their friend and benefactor. Their response and intelligent understanding of her efforts upset many legends and disprove many common concep-

tions of the dispositions of various dangerous wild things.

Years ago she began the work that was to make of her a pioneer in taming the world's deadliest snakes. As a young entomologist, she found her field trips constantly spoiled by her fear of any and all kinds of serpents. Her fellow bug-hunters laughed at her, and because of this, and because of a love of living things that was deeper than any fear, she began the study of reptiles to overcome her dread.

After securing an academic foundation, she went directly to Nature. Observing the agitation of newly-captured snakes, she invented a petting stick to soothe them and show them no harm was intended. This invention was a pad of cloth tied to the end of a short bamboo feeding stick.

UNTAMED AFRICAN SPITTING COBRA

This ringhal had been recently received and struck repeatedly at the glass of his cage while being photographed. He can shoot his venom eight feet

The harmless ones responded well to the petting. Her joy was complete, however, when after a few days a shipment of western diamond-back rattlesnakes, which had come to her violently excited, began to arch their backs to the caressing as a kitten would, and it was not long before she laid the stick aside and used her hand. About a year later, a pair out of this shipment of the most nervous, high-strung members of the rattlesnake clan presented her with the first litter of captive-bred rattlers on record.

Of course such things are not accomplished simply by stroking a terrified animal with a cloth pad. The results she was beginning to get came out of her endless concern for the comfort, health and happiness of her charges. It meant cleaning cages and studying diet, experimenting with sun lamps and helping them with their shedding. It meant learning great self control, moving slowly, speaking softly, remaining calm in danger. It meant deciphering what was in their minds from their movements and postures, and knowing what they were going to do before they did it.

She applied her methods to all the poisonous rib-walkers of North America with the same results. During her experiments she made the discovery that the snakes were ready to trust her before she was willing to trust them. This realization heightened her growing opinion of their intelligence. Her intentions were being quickly understood, and her dangerous friends were submitting calmly to such things as the removal of uncast eye plates, which had failed to come off in shedding. These she removed with tweezers. Sometimes the operation took a little tugging. The snakes never seemed to resent it and always seemed grateful to be restored to normal vision.

It must be remembered that in none of her work did she deprive the ophidians of their fangs or venom. Venom is not only a weapon, it is also a powerful protein-containing digestive juice; she could not conscientiously remove it from a helpless captive.

When she had succeeded with more than three hundred such specimens, including mambas, fer-de-lances, kraits, Gaboon vipers, Australian tiger and black snakes, ringhals, moccasins, coral snakes and copperheads, she felt qualified to attempt to tame even the king cobra, of which little good had ever been said, and much evil. She knew it to be the only snake that will attack man without provocation. She was aware that, because of its great quantity of particularly lethal venom, it was considered the most deadly living animal. To be bitten by one meant death in less than five minutes. Small game struck by a king die almost instantly. Elephants, bitten on their tender toes, or at the tip of the trunk, have been known to succumb within three hours. One cannot wonder that she chose the cobra to be last.

Imagine, then, her surprise when she found the king cobra to be the most intelligent, the most cooperative and the most easily tamed of all. Of course, this was not evident at the outset. Miss Wiley says that she doubts that many persons will try to tame them. There is no record to be found of anyone else's having done it. The reason is fairly obvious. Grace Wiley says that facing a wild king cobra is one of the most awe-inspiring experiences of her life.

"They come at you with a snort and a hiss, and they rumble down inside," she told me. "With their eyes glaring, their lower jaw hanging wide, their great hood raised, and with a fourth of their length reared, they charge you. They strike downward, as far as the length they have reared. The movement is extremely rapid. If a person is struck, there is no time for aid; the neurotoxic venom acts quickly on the nerves, causing paralysis of the heart."

Yet with fortitude, knowledge and good intentions, Miss Wiley, armed with a petting stick in one hand and in the other a short pole with a U-shaped wire at its end for restraining their advances, opened their cage doors just enough to work and began to apply kindness. At first, rapid retreats were frequently necessary; yet within five days she was stroking their tails with her hand when their heads were turned away, and on the ninth day she put

VISITORS SOON LOSE FEAR
A seven-year-old guest of Miss Wiley quickly makes friends with a large South American tegu lizard

aside the sticks and restrained the smaller of the pair—twelve feet long—with her unprotected hand. She describes as one of the most wonderful moments of her life the thrill of the proof that these great, almost legendary reptiles *could* but *would not* harm her.

The accompanying picture, taken last February, shows Miss Wiley and the larger of her present pair, which she calls King. He is fourteen feet long and weighs eighteen pounds. It was interesting to watch the "gentlemen's disagreement" between the cobra, Miss Wiley and her assistant, Wesley Dickinson, as preparations were being made for the picture. Miss Wiley carried the olive-green hamadryad from his cage, and at the request of the young woman photographer, attempted to drape part of the snake over her shoulders, with the rest of its great length on a small, thin-legged table. But King could not find a comfortable position. He seemed afraid that he would slip and fall, and kept trying to coil around something where he would feel secure. The legs of the table appealed to him most—which did not appeal to the photographer at all. Again and again King was unwound from the table and redraped. He kept backing out of Miss Wiley's loose grasp. Once he got entirely on the floor—with the photographer about four feet away. We caught our breath when Mr. Dickinson stepped in quickly and helped return King to the table top. Miss Wiley put us at ease by explaining that Mr. Dickinson and King were thoroughly used to each other.

Of course, the serpent could have put an end to what he must have considered an awful nuisance, simply by turning around and biting a few people. But he was up on his manners. The pictures taken, he was returned to his cage, puffing from his unaccustomed exertions. I, too, was puffing from the unaccustomed exertion of holding my breath so long. It is impossible for one entirely to forget tradition.

The photographer took some pictures of a ringhal, or African spitting cobra. This was a new, untamed specimen, rearing and spitting and striking every few moments, so he was photographed through glass. Ringhals throw venom straight into the eyes from any distance up to eight feet. The poison causes pain and temporary blindness even if washed out quickly, and perhaps permanent blindness if it remains long in the eyes. Miss Wiley wears goggles when making her first contacts with them, afterwards washing the venom from her face with plain cold water.

We took a picture of Gertrude, a big South American tarantula of the kind sometimes found in banana ship-

GERTRUDE, THE PET TARANTULA
She explodes the myth of the bad nature of these great arachnids as she steps gently from Miss Wiley's understanding hands to the author's

ments. She has been a pet of Miss Wiley's for four years. Once I was afraid of tarantulas, but such is Miss Wiley's magic that I let Gertrude crawl from Miss Wiley's hands to mine, as the picture shows. It was like holding a ball of velvet, except for the very faint pricking at times of the tiny tarsal claws. There was nothing disagreeable.

Tarantulas, I was told, could be picked up anywhere, simply by gently scooping them with both hands. They bite only when they are squeezed. Even if a person is bitten, the application of any common antiseptic is all that is needed. The bite is mildly uncomfortable and the result not dangerous.

Of the black widow, Miss Wiley says:

"We did not think them so bad before they received all of their recent publicity. While I don't advise anyone to attempt to handle any venomous creature without training and knowledge, it is possible to take black widows from their webs with the hands by going gently. I know, because I have done it many times."

We went out into the yard to look at a collection of turtles. I saw a sand cricket go legging across the ground. This is the familiar insect with broad black and yellow bands across its back. It is variously called Jerusalem cricket, child of the earth, and potato bug, this especially misleading. It fights like fury when agitated. Gentleness won again as Miss Wiley stooped and picked it up. It made no attempt to bite her.

She lectures before groups of both children and adults, and soon has people of all ages clamoring to hold snakes and pet Gertrude. It seems almost miraculous to see misconceptions and fears dropping away as she talks. Of course she does not let members of an audience do anything dangerous, but she does give them a first-hand acquaintance with forms of life erroneously considered offensive and repulsive.

The danger she reserves for herself. She seems capable of handling anything. Anything? In her own collection I found one exception—one living thing with which she could not make friends. It was a tiny, baby rattlesnake, too new in the world to know she only meant it well.

JACARANDA

By H. C. FORSBERG

Drawing by the Author

THE jacaranda tree of South America has found its place in the parks and gardens of California and Florida, probably within the last half century. There is a record of a planting in Punta Gorda, Florida, in 1899; there is an account of young trees growing in Santa Barbara, California, as early as 1895. As a conservatory plant, it bloomed first in England in 1822, and may now be found as a decorative tree throughout the subtropical regions of the British Empire.

Although the value of the species cultivated in this country lies in its beauty, a species of jacaranda—also called rosewood or pallissandre—yields cabinet wood of high quality, and has been a valuable article of South American export for more than two hundred years. Many beautiful buildings in that continent are enriched with carved furnishings of this wood.

A pine in the wind may make a whistle of its stiff needles; but a quiet jacaranda yields its fern-like leaves to the slightest breeze and permits it to move freely through its small leaflets and panicles of delicate, blue-violet flowers, leaving in its wake carpets of bloom.

In April in California flower buds begin to form in the axils and terminals of the boughs. As the season progresses, leaves develop, and trees in leaf and bloom may be found throughout the summer months. In the Transvaal, and other regions where the seasons are the reverse of our own, the trees bloom in October, November and December. The flowers are borne stiffly upward, suggesting the struggle for life in the shadowy solitudes of tropical forests where flowers, however delicate, must have strength to push through the ceiling of vegetation to reach sunlight, and must be sturdy of twig to withstand the strangling hold of vines.

Young jacaranda pods are green, woody and flat. Later, they turn a rich brown, smooth as polished wood, and finally become drab and gray. They burst open while on the boughs, releasing flat, brown seeds encircled by gossamer sails presenting disk-like surfaces to the wind.

From middle January until April, jacarandas shed their leaves, not all giving up their foliage at the same time. A tree barren of leaves in February may be growing near another that may indolently wait another month. A single tree may spend many weeks shedding its leaves, so gradual is change in a climate where the seasons steal gently by.

The small leaflets wither and drift away, as silently as snowflakes, and less visibly. The long mid-ribs of the leaves fall and lie scattered like thin carpets of giant pine needles. Leaves rather than flowers have fragrance—strange, musty fragrance that might well burden the humid nightwinds that sweep over tropical forests of the world.

"Bountiful" and "Old Heavy Berry"

By RICHARD W. WESTWOOD

RIGHT now, it appears, is the time to think about holly. Most of us do not get around to it until Christmas, and then, with some question in our minds as to whether we are doing the right thing, we buy our holly wreaths and branches.

Questions arise in our mind because we have heard that our native wild holly is being wiped out by gathering for decoration. It is. Laws are urged to prohibit gathering holly in the wild, or educational campaigns proposing substitutes in the way of decoration are recommended. Some such steps should be taken unless a way can be found to relieve the heavy and destructive drain on native wild holly plants. There is a way—one that will not only provide the decorative leaves and berries, but will adorn the home grounds and provide attraction for bird visitors. Plant holly—it is just as simple as that.

In Robbinsville, New Jersey, there is a farmer named Earle Dilatush. He produces luscious and varied crops and sells them at a farm market. But his greatest enthusiasm is holly. He loves holly. To him a holly tree is a personality. He has names for his favorites, and scions from these outstanding trees carry on the line.

"Much more can be done about saving our American holly by urging people to plant it around their homes than by discouraging or forbidding cutting in the wild," declares Mr. Dilatush. "American hollies can be successfully grown almost anywhere in the eastern states if we'll remember a few simple rules."

"OLD HEAVY BERRY" HAS BEEN THROUGH MUCH, BUT IS STILL AS STURDY AS EVER

Above is "Bountiful" a beautiful holly that has well earned its name and whose perfect form is more the result of good luck and strength than planning

"Such as . . . ?" we asked.

"Plant hardy, northern-grown nursery stock," he answered. "Use lots of oak leafmold and plenty of water. Add cottonseed meal and tobacco to the oak leafmold for maximum growth. Use no commercial fertilizer. Don't fuss too much with hollies. They can be killed with too much care. It's as simple as that, and more holly has been planted in the northeast during the past three years than in the fifty years preceding."

"What is the best time of year to plant?" we inquired.

"More hollies are sold during the fall than in the spring. They transplant well any time when the ground is not frozen hard. Want to meet some hollies?"

We did, and were introduced to "Bountiful", which struck us as holly perfection. This tree is sixty-one years old, twenty-eight feet high and twenty-two feet broad. Its former owners say that for twenty-one years it yielded the equivalent of six standard boxes of cut holly, and for twenty years before that, four boxes. This brought in eight hundred dollars. The tree received no cultivation of any kind. Its owners knew nothing about pruning and gave no thought to form. They just cut off the ends of the branches that were loaded with berries and sold them. The branches that laid on the ground easily took root and dozens of young trees were (Continued on page 472)

WAR ON CREEPING POISON

Let's strike it out—at the count of three!

By MARGATE KIENAST

Illustrations by Jex

WHY BE an ivy-covered ruin? If you have ever had an attack of "weeping blisters" you know better than anyone can tell you about the burning, itching skin eruption caused by poison ivy.

If you have never met the plant in Nature, better have someone point it out to you. The old couplet used for generations to warn that poison ivy is at hand—"Leaflets three—let it be!" This may lead you to snub a few innocent plants, but if you keep in mind the count of three it will help you to identify the botanical blister-maker. Then, stay away from it when you see it, or join in measures to strike it out.

Poison ivy has been around a long time. Perhaps the earliest mention of the plant in North America was by Captain John Smith who, in 1609, wrote:

"The poisonous weed being in shape but little different from our English yvie; but being touched causeth reddness, itchinge, and lastly blysters, the which, howesoever, after a while they passe awaye of themselves without further harme; yet because for the time they are somewhat painieful and in aspect dangerous, it hath gotten itselfe an ill name, although questionlesse of noe very ill nature."

Ivy, with its poisonous habits, has twined right around some of our best and most spectacular history-making. No doubt the covered waggoners had cause to regret the flaming vine, met and touched in their brave passage westward. In 1853-1856 the reports on the building of the Pacific Railroad, under "botany of the expedition", lament the effect of poison ivy on the men who were pushing back America's horizons with rods of steel and ties of timber.

In California, it was estimated that the pesky vine grew on the slopes of Coldwater Canyon on the southwest side of Mt. San Antonio at an altitude of 4500 feet. It was remarked that "the territory inhabited by poison ivy excludes the desert and central valley regions. . . . Only the lowest and the highest regions of California, therefore, are free from poison ivy".

The only thing that seems to be missing is a song of the range, an epic of the Rockies, a hill-billy fiddle piece, or a southern spiritual dedicated to the poison ivy vine. There must be one somewhere, steeped in tradition. Will you send it in for the theme song of the ivy eradication league? Certainly it is time a long-suffering public should decide to do something about ivy.

If you are properly equipped to battle this plant—armed with knowledge of likely locations and the habits of the enemy; uniformed with properly protective articles of clothing, or officially annointed for battle according to the ritual prescribed by the U. S. Public Health Service—ivy cannot win!

It can be routed from field and forest, from park and vacant lot, and from your own suburban back yard. It can be dislodged from stumps and fences, separated

Let's do something about that creeping poison—poison ivy. It can be fought on its own battlefield—and licked. Knowing it and avoiding it is not enough. The unwary and the uninformed will still suffer from the "weeping blisters".

Organize a drive under proper leadership. Enlist the cooperation of the Boy Scouts, Girl Scouts, Campfire Girls, women's clubs, garden clubs, civic groups and others and put on a systematic drive. Start now. Renew the campaign in the spring. This article provides much-needed information on the tools for such a battle.

We should like to hear reports of successful campaigns. Send them in with any helpful suggestions so that we may pass them on to others.

GO TO IT. LET'S STRIKE OUT POISON IVY!

from valuable ornamental plantings and blasted from rock piles and old fence-rows.

Don't dread it. Do something about it!

You cannot catch ivy poisoning without going near ivy. Nobody can give it to you by sprinkling dust on your doorstep. You cannot get it from anyone who tries to put a spell on you. Usually the person who is sensitive to the oil of the leaf of ivy must come in contact with the plant in order to have an attack of ivy poisoning. They must also be "sensitive" to the poison in the allergy manner. Many persons who think they are so sensitive to the plant that they are affected even if they pass near it actually have come in contact with the plant without knowing it. "Previous contact is necessary for the development of sensitization to a plant", the scientists say, and they have gone to a lot of trouble to prove it.

For example, they mixed up a batch of concentrated extract of poison ivy and took it to Baffin Island where they "patch-tested" sixty-five Eskimos. Poison ivy does not grow north of the St. Lawrence River; neither did the skin eruption they were trying to produce. But, Eskimos have the same racial characteristics as American Indians further south, and Indians were reputed to be able to walk through infested areas, handle the plant at will, and pin ivy leaves to their ceremonial blankets without developing flaming skins. The ivy had been here as long as the Indians. Could it be, then, that Eskimos and Indians had developed some common racial protection—some immunity?

Full-blooded Indians from thirty-two tribes were daubed with the ivy brew and fifty-six percent of them promptly came down with ivy poisoning. Another legend bit the dust. Navajo, Pueblo and Apache, although accustomed to use dyestuffs and concoctions made from plants that white men avoid, itched and scratched and took to their tepees to recover from white men's herb doctoring in reverse.

Having run out of adult early Americans, twenty-eight infants who had never been beyond the doors of their foundling home refuge were patch-tested and found non-sensitive. They had no green garlands in their nursery; they developed no signs of ivy.

Without exposure to the plant, then, you cannot say you are "sensitive". But watch your local exposure index. For no one is permanently immune, and persons after years of handling the vine unscathed may fall a victim. In areas where there is a heavy growth of ivy it is almost impossible to miss poisoning. You must get rid of the plant!

"THE POISONOUS WEED . . . CAUSETH REDDNESS, ITCHINGE, AND LASTLY BLYSTERS", WROTE CAPTAIN JOHN SMITH IN 1609, AFTER HIS FIRST ENCOUNTER WITH THE POISON IVY OF THE NEW WORLD

Put on a heavy pair of gloves—don't wear shorts for this job—and cut the plants with a brush hook as close to the ground as possible. Do not throw the cuttings where someone else will pick them up. They should be burned, but in burning them take care to stay away from the smoke. Ivy poisoning from the burning plant can attack the sensitive skin, and is especially dangerous to the eyes. The plant is a runner and it is hard to get the underground stems out. But, if you persist in getting rid of the foliage, poison ivy will gradually disappear, since underground stems are dependent upon leaves for their food supply and will die without this.

Most root systems give up the struggle after sending out three crops of leaves, but old, large roots may produce four sets, or even more. It is important to destroy each crop as fast as it forms, and to be sure the life of the root is ended before you quit, or the plant will re-establish itself.

If there is a chance that you will touch ivy leaves with your bare hands, it will be well to annoint yourself in advance to protect arms, hands, legs and face. The face

is frequently affected because the fresh juice of the plant has been carried to it by the hands, an easy and common method of transferring the poison in summertime when one is perspiring. An effective oxident cream has been developed by the U. S. Public Health Service. This is a mixture of inexpensive vanishing cream and ten percent sodium perborate. It works well enough to be a boon to many persons afield anywhere in ivy-infested regions.

Trouble often comes to sensitive skins when ivy resin has contaminated shoes, clothing, heads of golf clubs, work tools, door knobs, or the coats of family pets and farm animals. Enough oleoresin may cling to the hands of persons who have touched ivy vines to inflame the skin of especially sensitive persons for as long as six hours, even if the purveyor washes his hands before shaking hands with the one most susceptible to the poison.

INDIANS WERE SUPPOSED TO HAVE DEVELOPED A RACIAL IMMUNITY TO POISON IVY, BUT THIS THEORY WENT GLIMMERING WHEN FULL-BLOODED INDIANS OF THIRTY-TWO TRIBES WERE DAUBED WITH IVY BREW. FIFTY-SIX PERCENT OF THEM PROMPTLY CAME DOWN WITH IVY POISONING AND TOOK TO THEIR TEPEES

The U. S. Department of Agriculture has a section on Noxious Weed Investigations. It advocates killing this troublesome plant by spraying the leaves with a good chemical weed killer. Best results, it advises, can be obtained by using sodium chlorate. This can be used as a solution sprayed on the foliage, or in dry salt form scattered on the soil.

It is so powerful that care must be taken that the spray solution does not reach the leaves or tender bark of valued plants. The solution does not usually affect the bark of trees, but if a vine is clinging to the trunk, cut through it with a hatchet or knife and then spray the subsequent re-growth when it appears from the roots. Poison ivy can be sprayed at any time when the plants are in leaf, but if the treatment is begun early in May or June there is time to kill the plants before autumn. Ivy dies hard and is a worthy opponent. It takes about four weeks for full development of a leaf, and they keep on coming.

If you are going to use quantities of spray to clean up along a bridle path or a camp-site, in sections where there is dense growth or where ivy grows in the form of tall bushes, hand sprays or bucket pumps are likely to be most unhandy. For large operations a barrel pump or even a power outfit is needed. Whatever the type of sprayer, the nozzle should be on a pipe at least two feet long so as to enable the operator to keep away from the vine.

Spraying should be done in cool, cloudy weather, or in the evening, rather than in the middle of a hot, dry day. Sodium chlorate is not poisonous, but it is a dangerous fire hazard. A mixture of dry sodium chlorate and organic matter is explosively inflammable. If it soaks into wood, clothing, or any other combustible material and dries, fire danger is right there beside you as you work. Your ivy-drenching campaign may deforest a dozen acres before you can turn it off if someone drops a match. So be careful. Clothing worn while spraying should be removed before it dries and immersed in water containing washing soda—two pounds to the gallon. Later it can be washed with soap.

Where poison ivy is growing in rock piles, or in other places where no harm will be done if all vegetation is killed, dry sodium chlorate may be spread on the soil at the rate of ten or twelve pounds per 1000 square feet. One application will kill all the plants whose roots are in that area and will keep the place free from vegetation for twelve to eighteen months.

It is also possible to *poison* poison ivy. Remember, though, that powerful chemical weed killers that contain arsenic can be used safely only in protected areas. Vegetation treated with arsenicals is dangerous to grazing animals until the poison has been washed into the soil by heavy rain. Poison sprays have been found so dangerous to humans that in some communities special permission must be obtained before using them. Sodium arsenite or arsenic acid are effective for poison sprays. A solution of four to six ounces of dry sodium arsenite, or three to five ounces of arsenic acid per gallon of water, used at the rate of one to two gallons per 1000 square feet is an average dosage. Sodium arsenite made into a water solution (ten to twelve pounds per 1000 feet), applied to the soil with a sprinkling can, will prevent all plant growth on any rock pile you can select for two years or more.

If you are one of those thrifty souls who likes to use up things you have around the house, waste crank-case oil diluted with at least an equal volume of kerosene

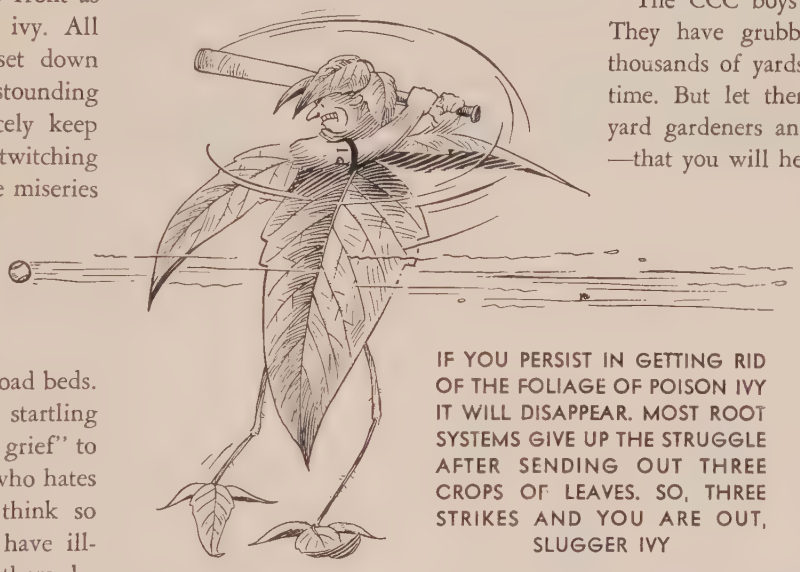
to make it spray readily has proved to be fairly effective.

Other substances that may be used to spray poison ivy—none of them, however, quite as satisfactory as the blitz-formulas already described—are, *per gallon of water:* common salt, two and one-half to three pounds; ammonium sulfate, two to two and one-half pounds; iron sulfate, two pounds; ammonium thiocyanate, two pounds; sulfuric acid, half a pound; calcium cyanamide, two pounds. Sprinkling chemicals on dry leaves is not nearly so effective as the spray method. Dry materials, if used, should be applied when leaves are moist with dew or rain.

The extent of disability caused by ivy poisoning has never been reported in a way to be "statistically" apparent until recently. Samuel Lauderdale, safety engineer in charge of the boys of the Civilian Conservation Corps, is charged with the duty of keeping track of accidents and illnesses due to "conditions of employment" in the Corps. And right up front as a menace is poison ivy. All the encounters are set down and add up to an astounding total. You can scarcely keep your own skin from twitching in sympathy with the miseries of those denim-clad youngsters who have been hand-tailoring our woods, fields, mountain sides and road beds. Figures? They are startling and a cause of "pure grief" to the safety engineer, who hates to have Americans think so many of their boys have illnesses thrust upon them by reason of the employment to which they are assigned. There are 260,000 boys, and one out of eight, per thousand, has an accident or illness recorded per month. Anxious mothers, if they saw the figures, might read into them hazards of tumbling rock, sharp saws and axes in inexpert fingers, but the fact of the matter is that in ivy season—early spring and summer—eighty percent of all the "accidents" and "illnesses" reported for the group were full-blown cases of poison ivy.

The care of the boys does not stop with recording the accidents, of course. The poison ivy scrub-up at night is part of CCC routine. In this way many exposures to the juices of the plant cannot last very long. The eruption usually appears twenty-four to forty-eight hours after exposure, so if the juices are removed from the skin within a few hours, the chances of preventing an attack are fair. The CCC woodsmen come in at night and scrub with yellow laundry soap—their tools and clothes are especially treated. Dollars and dollars of "medical funds" have been spent on protective injections of poison ivy extract. Some medicines are given by mouth. The method works on the principle of the old tradition that people sensitive to poison ivy plant could start young, chew a leaf now and then, and obtain immunity.

Don't let anyone persuade *you* to eat ivy leaves. This is a dangerous thing to do and is known to have caused severe, even fatal, cases of poisoning. If your doctor administers modern *prepared* extracts, with the dosage adjusted to the individual, he can determine what is best for you. If you take anything by mouth, *see your doctor* first rather than take any chances.



IF YOU PERSIST IN GETTING RID OF THE FOLIAGE OF POISON IVY IT WILL DISAPPEAR. MOST ROOT SYSTEMS GIVE UP THE STRUGGLE AFTER SENDING OUT THREE CROPS OF LEAVES. SO, THREE STRIKES AND YOU ARE OUT, SLUGGER IVY

The CCC boys will join the fight. They have grubbed out and burned thousands of yards of the stuff by this time. But let them know—you back-yard gardeners and week-end campers—that you will help, too. Come down off those horses, you trail-riders, and stamp ivy out with your gaunt-leted hands and smart riding boots! You telephone linesmen who have lost a day's work because of the shining little climber that sneaks up the company's poles—get that trouble-maker off your right of way! Summer fishermen—sink that vine along the banks of the stream and make canoe portages and camp sites safe for those who come after you.

Hikers and Nature-lovers—you who have fought to protect the dogwood; to urge outdoor good manners; to save our vanishing arbutus and ground pine, ladyslipper and Indian pipe—here is something you can rip up. It will satisfy the urge to battle the forest—and you may feel entirely righteous while you are doing it.

And you home-towners, clean up that baseball lot. A national game can be made of getting rid of a national nuisance. At the count of three—strike ivy out!

•

A CONFLAGRATION

By MAE MEAD PLAGMANN

Out on a lonely road
My pony jogged along;
Poetry was in my soul,—
I hummed a little song.

Then—around a curve,
Yellows burst in billows!
Right before my eyes, God's sun
Was burning up the willows.

A BEND ON THE MOUSE RIVER

Meandering for 360 miles through a 170-mile valley, the river still flows gently in its natural course in many places. (Below) A western willet on its marginal beat. More than two dozen species of shorebirds have been recorded in the Lower Souris National Wildlife Refuge, including plovers, ruddy turnstone, Wilson's snipe, sandpipers, yellow-legs, dowitchers, godwits, sanderlings, avocet and phalaropes. It is a real haven for the bird photographer

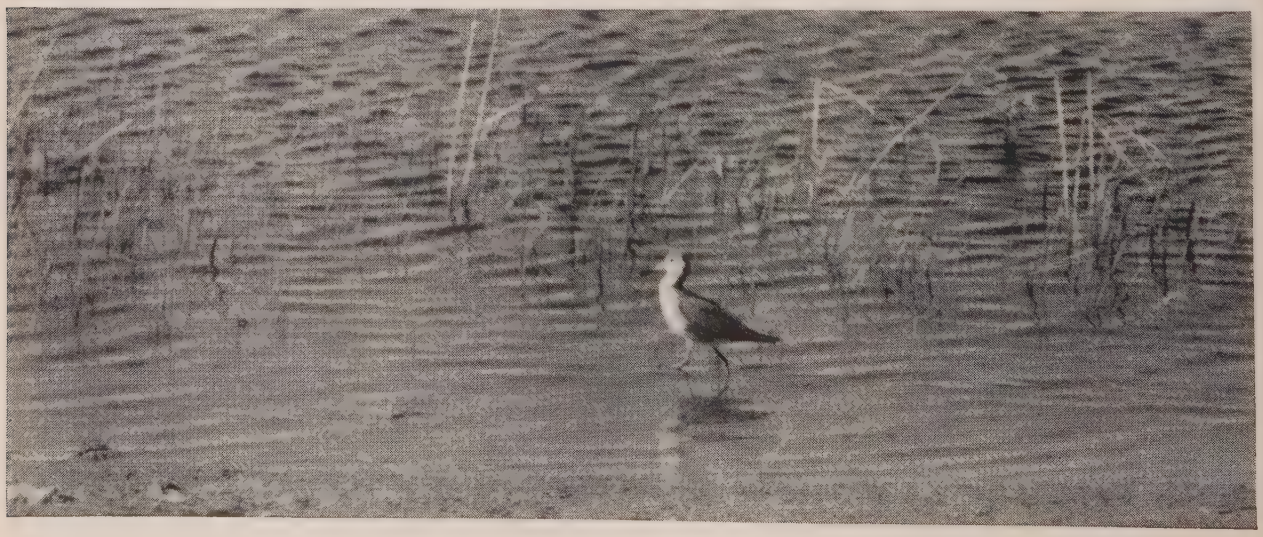
Of *The Mouse* and Men

By HOWARD ZAHNISER

With C. C. C. Photographs by W. J. Mead

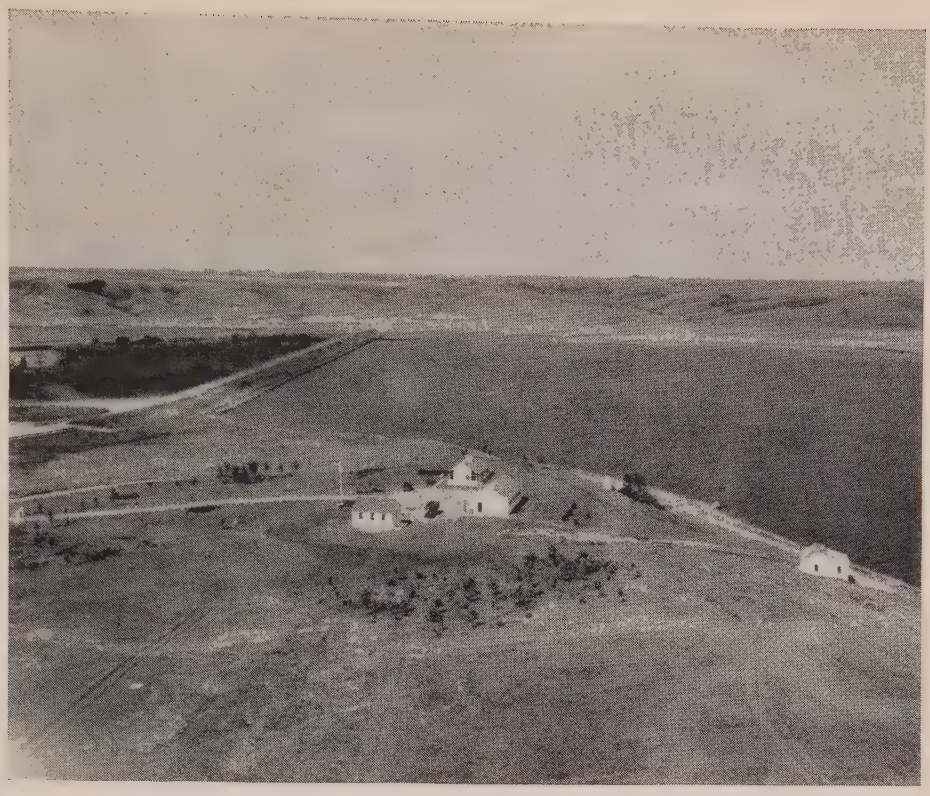
THE associations of man and rivers are as old as the junior partner himself, but new arrangements are constantly being made. Man, the enterprising member of this partnership, always seems to want to do something with any river he finds. The rivers themselves—the silent partner—flow on, as long as they can, with the single "purpose" of reaching the lower levels as quickly as possible. In the course of their flow they afford man rich benefits, but he often tries and errs again and again before he learns to understand this silent, senior partner—sometimes because he confuses profits and benefits; sometimes because he has not enough experience to balance one day's gain against another day's loss. It takes wisdom and skill to make the most of an association with a rich but silent partner that has but a single "purpose."

Consider man thus in the collective sense and the concern is with many rivers—rushing torrents like Niagara, mighty streams of slow motion like the Mississippi. Consider a particular river, however, and the concern is with many men. William Meddaugh, whose reminiscences I heard on his seventy-fifth birthday in the Westhope, North Dakota, hardware store that he has run for nearly



LAKE DARLING IN THE VALLEY

This is formed by impounding 112,000 acre-feet of water behind Dam 83 at the site of the Upper Souris Refuge. The lake assures a water supply for dry years, creates marshes up-stream and helps prevent floods. (Below) A pair of scaups on the Mouse River marshes. An estimated 25,000 pairs of ducks nest annually on the marshy areas created by the impoundments in a valley that was useless for waterfowl when the restoration work was undertaken in 1935

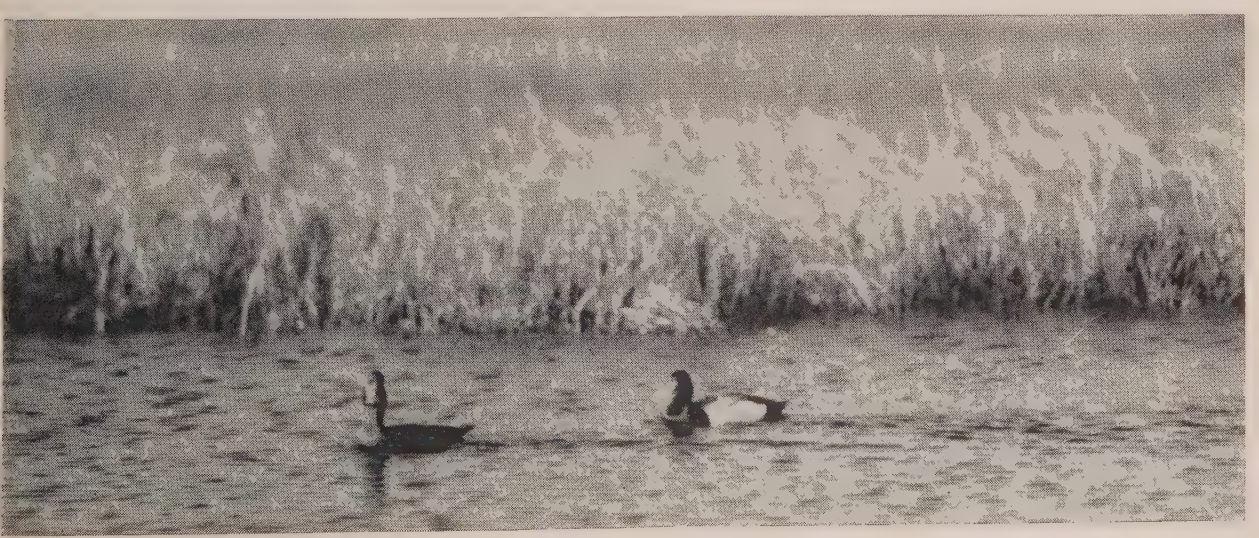


forty years, has always been content to live within an easy distance of the Mouse River and let it meander on its own gentle way, spreading out into marshes, and attracting the waterfowl whose hunters bought shells at the Westhope hardware. Other men, however, could not endure the slow and devious course of the Mouse, nor its marshlands, for they could not resist the hope for the crops that they thought could be grown in the valley—if the stream bed could be straightened and the marshlands be watered only enough for farming. When the success of these men brought failure, still others threw dikes across the valley, making more marshes than the Mouse itself once made, hoping thus to make the senior partner in their enterprise do better the thing that it seemed to them to do best.

I went to the Mouse River myself, not only to see the stream in its valley, but also to understand better the work of the men who have lived with it and worked with it.

There is enough interest in either subject. The Mouse River itself is unique as far as I know. It has neither source nor mouth. It is simply translated into English and again into French. Flowing southward, the Souris River—named for the wild rats and mice that bothered French trappers two centuries ago—reach the boundary of Canada and slips over into the United States. Out of British soil into English speech, its waters become the Mouse. For 360 miles through a 170-mile valley, the Mouse River flows in a serpentine loop, counter-clockwise, until about 55 miles to the east it carries its waters out of North Dakota, and, as they once again cross the international boundary, they resume the Souris River, flow on to the Assiniboine, and eventually reach Hudson Bay.

The Mouse River Loop is in North Dakota's rolling

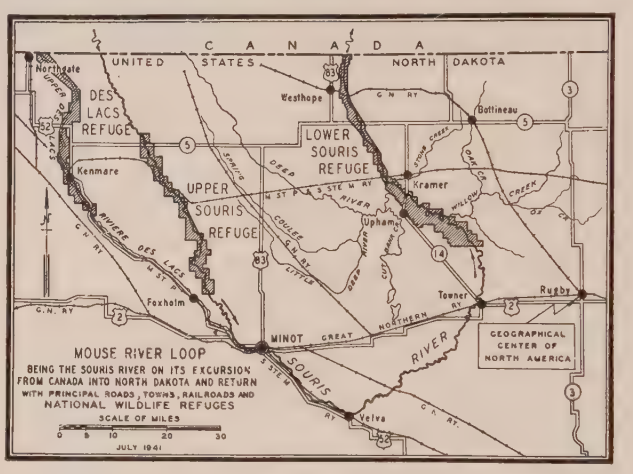


C. C. C. BOYS AID IN WILDLIFE STUDIES
Enrollees drag a long wire to flush sitting birds and to help in recording data on the avian population

plains, but a man who never left the stream would never know this. Traveling a river that meanders so much that in one place he would paddle thirteen miles to reach a point three miles away, he would cross and recross a valley half a mile to three miles wide between apparent hills one hundred feet high. He would never know what a long trek it would be to find the opposite slopes of these "hills." If he climbed out of the valley he would simply go uphill to the rolling, glaciated prairie. If he stayed on the river from Canada to Canada he could drift for many miles between elms, boxelders, choke cherries, wild plums, ashes, willows, and other riparian trees and shrubs that grow as they always have grown, and he would also see many acres of natural marshes where ducks go in pairs in the spring and feed in flocks of thousands in the fall. He would pass many valley farms so scenic and beautiful that he would never think of the farmers' labors, and several quiet small towns with their grain elevators strikingly perpendicular in a horizontal land. He would wind his way through the city parks of Minot, metropolis of the area. And for 180 river miles he would be passing through two of the greatest wildlife refuges in the United States, crossing nine major, valley-wide dikes that create marshes that produce more than 200,000 waterfowl each season of nesting.

This was the river that I saw first at Towner, North Dakota, as a slow-moving, deep-looking stream between high, wooded banks, with a colorful prairie sunset in the distance—recalling Thoreau's question: "What can be more impressive than to look up a noble river just at evening,—one, perchance, which you have never explored,—and behold its placid waters, reflecting the woods and sky, . . . tempting the beholder to explore it and his own destiny at once, haunt of waterfowl?" I had come from the east with W. J. Mead, the official photographer for the Civilian Conservation Corps, bound for the refuges that were being developed by the Fish and Wildlife Service with the essential help of the C. C. C. It was dark as we first followed the river, traveling downstream to reach the eastern refuge, and so during the next week we actually saw the Mouse River as one who goes upstream—a circumstance that proved fitting and proper.

For three days we exercised our eyes, ears, and muscles from end to end of the 58,925-acre Lower Souris National Wildlife Refuge. Mead busily photographed the C. C. C. enrollees, the improvements they have made and are making, and the wildlife they are benefiting. I observed as much as I could



WATER CONTROL GATE AT DAM 87
Nine major, valley-wide impoundments have created marshlands where the water is regulated by such control gates

and listened to the explanations of Refuge Manager Cordia J. Henry and his believe-it-or-not but true accounts of the changes that have been brought about since the refuge was established in 1935.

We saw and photographed the latest, northernmost, and best of the major, valley-wide impoundments, which was constructed by the C. C. C. enrollees—Dam 357, named as all the others are in accordance with their river mileage from the point where the Mouse River begins in North Dakota. We also visited Dams 341, 332, 326, and 320; traveled most of the forty miles of refuge roads built by the C. C. C.; saw many of the 200 miles of boundary fences they have erected; inspected the water-control gates they have installed; watched them laying culverts, helping in nesting studies, and working in the nursery from which transplantings are made to provide food and cover for the wildlife and shelter belts for refuge headquarters; and we rested or read reports in the headquarters buildings that the C. C. C. enrollees have helped to build.

SHARP-TAILED GROUSE IN THE UPLANDS

A common resident in the refuge. Below, four young chestnut-collared longspurs register expectation of a meal when they are disturbed by the sound of the photographer nearby

Three crowded days, we found, were really too brief a time for this visit, but we had the tyranny of an itinerary that drove us on. As we started up the river on our way to the Upper Souris National Wildlife Refuge, a tremendous thunder storm and a great wind made the going as slow as our reluctance to leave, but at Towner we left the valley, cut across the Mouse River Loop on Route 2 for Minot, and as we traveled westward we saw to the north the long roll of dark storm clouds sweeping on to the northwest, with sharp lightning. It was a different evening scene from the sunset that we saw when we first came to the Mouse.

On two rainy days that followed we traveled the Upper Souris Refuge, seeing further evidences of the work of the Civilian Conservation Corps and the Fish and Wildlife Service experts who have been working with the Mouse River for wildlife. Here were the four other major dams on the Mouse—96, 87, 83, and 41—the greatest of these, 83, impounding 112,000 acre-feet of water, creating "Lake Darling," and insuring a water supply for the marshes of the Lower Souris Refuge if dry years come. It also helps to protect the city of Minot from floods in their seasons. Through many of the 33,008 acres of the refuge, with Manager F. Sheldon Dart, we traveled some of the 85 miles of road that the C. C. C. enrollees have constructed, and as "Easterners" took turns in opening the inevitable gates in 128 miles of C. C. C. fencing. On every hand we saw the evidences of the activities of the enrollees who have been making the area better for wildlife and easier to administer.

All these activities, however, on both refuges, were eclipsed in interest by their results. Six years ago the valley lands that are now the Lower Souris Refuge were dry, the gumbo cracked so that a man might sprain his ankle if he walked without care. In the early days the river's natural marshes had attracted so many ducks that hunters had come from as far away as New York, Chicago, and Minneapolis and had shot so many birds that they piled them for forty feet in front of Meddaugh's hardware and draped them on the gateposts of Westhope. The dredgers, seeking farm-land profits, had changed all this, but the dry cycle had wrecked their plans. By 1935 the valley was no place for ducks. Yet we saw so many waterfowl on the lower Mouse River marshes of 1941 that we considered the refuge estimate of 25,000 pairs as conservative. And we knew that this was largely a result of man's restoration of habitat and his development work.

On the margins of the marshes we saw willets, stilt sandpipers, godwits, and other shorebirds. We found a chestnut-collared longspur's nest with four young in the grass where we stopped to photograph a dragline operation. Blue-winged teal, ring-necked pheasant, and songbird nests we found in (Continued on page 472)

Boom in Blooms

United States moves to meet bulb shortage

By ANDREW S. WING

Garden Editor, Nature Magazine

PHOTOGRAPHS FROM W. ATLEE BURPEE

"WHO HAS NOT HAD HIS HEART SKIP A BEAT WHEN, ON A DRAB DAY IN LATE WINTER, HE STEPS INTO THE GARDEN AND FINDS THE FIRST SNOWDROP!"

As OCTOBER'S mellow sunshine climaxes the growing season, we must think of the impending sleep of winter and of spring's resurrection. To most of us, whether gardeners or not, spring means crocuses, daffodils, hyacinths, tulips and the many other bulbous plants that have slept through winter to be aroused by the warming rays of vernal sunshine to brighten borders and gladden hearts.

While chrysanthemums, purple and blue asters, goldenrod and fringed gentians still glow brightly against backgrounds of bracken, there is time to bury the modest, brown-skinned bulbs that will dazzle us with glorious color and graceful forms when the ground warms up six months hence. Some of these bulbs are hardy perennials that need only to be divided every few years to keep them blooming, while others are less long-lived and require replacements every few seasons to keep them in the foreground of our garden picture.

Time was when a tulip was worth its weight in Dutch guilders. When the great tulip craze first struck Holland fortunes were made and lost in one of the most famous orgies of speculation the horticultural world has ever known. Legendary, now, is the tale of the hungry Dutchman who peeled, sliced and ate a prize tulip by mistake, much to the dismay of the owner when the loss was discovered.

Today hungry Dutchmen and their uninvited German guests are again eating tulips (said to be a valuable source of vitamins) because there is no way to get them through the blockade. Over here they command a premium, while our sterilized gold is buried in the ground and not doing us as much good as a good boatload of Darwin or Breeder tulips would. Such is the crazy way of a topsy-turvy world! A Dutch grower who has a considerable acreage of tulips on Long Island told me recently that he doubted that Holland would ever again be able to dominate the bulb market as she once did—that her stocks were rapidly being depleted and that it would take years to build them up again. Meanwhile, American growers are learning the tulip game, and gardeners are finding out that home-grown bulbs perform as well, or better, than those that are matured behind the dykes of the Zuyder Zee.

There are, of course, tulips and tulips, literally thousands of varieties and a number of species. They range from the small, dainty early sorts to the giant, late-flowering Darwins and Breeders that make such a show in May gardens. But it is well to recall that some of our most precious bulbous treasures are the smaller, less conspicuous, but none the less beautiful early bulbs, such as snowdrops, scillas, crocuses and narcissuses. Who has not had his heart skip a beat when, on a drab day in late winter, he steps into the garden and finds the first snowdrop! Or who is so blind to beauty that he cannot become a bit excited when the snow melts away from a sunny spot near the

house and a clump of golden crocuses rear their heads, defying freezing weather and late snows to come?

Robins may be harbingers of spring to poets, but to me the crocuses are an unfailing sign that warmer days are ahead. And while even crocuses get fooled at times, it seems not to matter to them if their noses and toes do get nipped by frost. The same holds true for most early bulbs, many of which originated in the mountain meadows of Europe. A little freezing and thawing annoys them not at all.

For a permanent garden investment you can not do much better than to buy a good basic collection of narcissuses. The hardier members of this race are everlasting —almost—if they are planted in a congenial spot and are lifted and reset often enough so that they do not crowd one another beyond the blooming stage. If you wish to use them to brighten up early spring borders, they can be grown in clumps of a dozen or so between later-flowering annuals or perennials. If you start with a dozen good bulbs, it is not difficult to multiply them by division every few years until in five years you may have tenfold the bulbs you started with, all of blooming size, too.

Some of the other bulbs have a way of perpetuating their kind in an agreeably surprising way. About ten years ago I planted a quart of grape hyacinth bulblets that I got from an Oregon grower for the amazingly low price of seventy-five cents. He claimed there were a thousand bulbs —and there probably were—all quite small but some of blooming size. I planted them along a small hedge, in borders and in a row in the garden. Every year since then I have dug up grape hyacinths from that garden row, each time carefully harvesting all the bulbs large enough to be seen. Yet each year there seem to be as many left when blooming time comes in the spring as there were before. Star of Bethlehem is another old favorite that has so naturalized itself in old gardens and fields in older parts of the country that many think it a native wild flower.

Along woodsy paths, in meadows, beside the dry banks of streams, in the edge of a shrubbery, and around boulders the poet's narcissus and others of its type do wonderfully well. Almost anywhere, in fact, where their feet will not be too wet, the soil is fairly fertile, and the spring sun can enter, is a good spot for these early spring visitors. An easy and effective way to naturalize narcissi is to lift the crowded clump with a spade, pull apart the onion-like bulbs, and insert them in an opening made by your spade, holding the tops to prevent their being covered too deeply and to keep them upright as the ground is pressed back together with your foot. Three to four inches is plenty of soil over each bulb, depending somewhat on size as the smaller the natural size of the bulb, the shallower the hole can be. They will flourish and bloom, even in tall grass, the only caution being that their tops must not be cut off until they have had a chance to gather strength for next year's blooming.

In case you do not know, the large, trumpet kinds are correctly called daffodils, while the smaller, many-flowered varieties are the true jonquils. Since all belong to the narcissus family, you may safely refer to them as narcissus, and it is nobody's business if you prefer to call them all daffodils. Since there are literally thousands of varieties of horticultural origin, in addition to the natural species, it is small wonder that almost everyone except the experts are confused about the nomenclature of the narcissus tribe.

While we are thinking of naturalizing, do not overlook crocuses, native lilies, and some of our smaller but charming native bulbs such as the western dogtooth violets, snow-white trilliums, Mariposa tulips—to name but a few of the commoner and easier ones.

Now that war has laid bloody hands on Europe and we can no longer obtain bulbs or other nursery stock or seeds from the Continent, we are faced with the alternative of either doing without tulips and other garden favorites or growing our own supply in this country. American growers, alert to the possibility of profitable tulip production, have lost no time in seizing this golden opportunity. From the start they have already made it appears that a few more seasons might see an adequate supply of tulips grown here. In Holland tulips are grown commercially in beds

CROWN OF GOLD, A DOUBLE TULIP. THESE OFFER A CHALLENGE TO THE AMERICAN GROWER THAT HE CAN MEET IN THE PROCESS OF DEVELOPING OUR BULB INDUSTRY HERE

that require much hand-weeding and cultivation, but over here they are being planted in long rows that can be cultivated by machinery. Thus it appears doubtful whether the Dutch, even if the war should end next year, will be able to dominate the world tulip market again in the face of strong American competition.

The old tradition, carefully fostered by importing bulb men, that only Holland's skill, soil and special climate could grow and mature top-quality tulips has been shattered. Recent large-scale bulb growing operations on Long Island, along the South Atlantic seacoast, in Michigan, and in Oregon and Washington have demonstrated that good bulbs can be grown over here, just as good in fact as the Dutch product in all, perhaps, but looks. Furthermore, the home-grown tulip is better for forcing as it blooms in time for the Christmas trade, a trick that was not possible with the old-world product.

THE GUINEA HEN FLOWER OR CHECKERED LILY IS AN INTERESTING MEMBER OF THE GARDEN FAMILY AND WELL-NAMED

England has been growing tulips for some time, and now that her gardening efforts are somewhat diverted into food channels, she has a surplus to send over here in exchange for credits for defense materials. The British crop this year has been disappointing due to an unfavorable season, so the expected 24,000,000 bulb crop that she was planning to send us will be considerably reduced. There will be English tulips, however, to supplement the home-grown product, but the total supply from all available sources will be considerably less than our normal planting needs. So order early and from reliable dealers to make sure of getting your needs filled with bulbs of good quality.

Japan has been another important source of tulip and lily bulbs and other horticultural products. Japanese tulips have not been of very high quality and will not be badly missed, but the cutting off of this important source will be felt in other lines. Madonna lilies, too, are short this year and higher in price, but here again we are learning to produce our own supply. It is a sad reflection on the moral health of nations that we should sever gardening relations with Japan, one of the truly great horticultural sections of the world, to our mutual disadvantage just because the ruling military clique in that naturally peaceful country chooses to wage an imperialistic war.

But, as has already been suggested, the ill-wind that blows the horticultural trade no good in Germany, Holland, France and Japan, may in the long run put the United States in a position to dominate world trade in this field simply because we are compelled to master the business of growing our own supply. As a nation we have never been loath to pass up a profit, or a prospect of one, and while few fortunes have been made in the seed and nursery trade in this country, and it is too soon to predict the outcome of the new boom in bulb growing, some sizable enterprises are already under way.

Fifteen years ago this month I made a short tour of the fascinating garden sections of western Washington and Oregon. In the valleys and coastal plains between Seattle and Portland lies one of the most diversified and intensive horticultural regions in the world. Here are dark rich soils, newly carved from dense forests that still tower in the background. Tempered by breezes from the Pacific and Puget Sound, moistened by heavy rains and frequent fogs, but with enough sunshine to make plants healthy and happy, these farms produce an amazing variety of high-quality bulbs and other horticultural products. In less than two weeks' time I visited farms that were growing narcissus, English holly, apples, prunes, English walnuts, and peppermint. In the shadow of the towering, snow-clad peaks of Mt. Ranier, Mt. St. Helens, Mt. Hood and lesser mountains this has been going on long enough so that a generation of men have learned the game and are eager to get their $10,000,000 bulb crop to the consumers.

To the south, of course, is California with her great diversity of climates and soils; already preeminent in seed production; first in the volume of oranges, avocados and other semi-tropical fruits and ever ready to seize any golden opportunity. We will have tulips and other bulbs.

Here is a tip in closing for those who cannot keep their tulip plantings over because of the raids of mice and other rodents. Narcissus bulbs are distasteful to most rodents, so if you mix them with your tulips it helps discourage the diggers. Moles, it is claimed, do not eat tulips but mice use their tunnels. Treating the bulbs with chemicals is another way to protect them. Or you can use poison bait. Or plant your bulbs in wire cages or behind barriers of chicken wire. Some claim that castor oil beans or moth balls will help.

DATE PALM

Our Fruit Stores

The sixteenth in Nature Magazine's series of educational inserts

By E. Laurence Palmer

Drawings by Elizabeth L. Burkmyer

BANANA

I INTENDED starting this article with the statement that when you walked into a fruit store you were welcomed by a host of opportunities. It happens, however, that I do not know who you are. You may be a restless globe-trotter, a botanist, a gardener, an economist, an aproned dietician, a starry-eyed bride, or just an ordinary gastronomic dilettante seeking something to tickle your appetite. And so it is absurd to assume that each of you will see the same thing in the fruit store.

In an earlier insert of this series, we visited a nut store. Still earlier we went around to the barn and got acquainted with the domestic animals. Eventually we should visit the zoo, poke around the kitchen, cellar and attic, go out on the lawn and possibly take time better to know our fellow men. In some respects, such studies are as natural as the orderly arrangement of sands and gravels along a wave-washed shore or the divisions of great areas of land into forest, field, desert, marsh and sea, or even the more limited division of the things we know into mammals, birds, and fishes—and so on.

While a nut store contains products that are not nuts technically, and a drug store contains everything from electric curling irons to aspirin, the average fruit store sticks rather closely to fruits. Dried dates, figs and prunes are in boxes on the wall. Bananas and grapes hang in bunches. Oranges, apples, lemons, cucumbers, muskmelons, peaches, tomatoes, eggplants, peppers and pineapples provide a varied color pattern on the shelves and in the windows. All of these are truly fruits in the strictest technical sense as well as in popular concept.

When a globe-trotter walks into a fruit store he lets his imagination run to the ends of the earth. He sees dates from the hotter desert lands, pineapples from the hot but wetter lands, bananas from the more humid and protected tropical regions. The pineapple brings up visions of dancing hula girls, of gigantic cockroaches, delightful little lizards, surf boards and lunar rainbows. He has memories associated with papaya, guava, avocado, mangos, mountain apples, and their kind. The storekeeper would gasp if he knew how earnestly this globe-trotter yearns for a real plant-ripened pineapple, and how much he would be willing to pay for one.

When our globe-trotter looks at the oranges and other citrus fruits, he thinks of southern California and Florida. But his memory may carry him to some such romantic place as Jamaica, where he was served grapefruits that melted in his mouth without the help of sugar—served by kindly colored folk who pattered about in bare feet while the pigs rooted just over the porch rail, the pigeons flew in and helped themselves at the next table, and to keep the insects out of the soup the chinaware was all turned bottomside up until the time came for it to be filled.

PLUM

PEPPER

FIG

CONCORD GRAPE

TOMATO

Our globe-trotter's national pride makes him realize that it is hard, even in Jamaica, to beat a tree-ripened Florida grapefruit or a California orange. He realizes that while the bananas in the fruit store may have been harvested in the tropics by practically peon labor, he knows that much of the labor employed in harvesting and packing oranges in the United States can maintain a higher living standard. Of this he is justifiably proud.

Our globe-trotter's recollections picture regions where there is a long growing season free from frost. He sees fields of Colorado muskmelons, orchards of Georgia peaches, New York pepper and eggplant patches, and California raisin and prune ranches. He moves on to the more northern climes, even up into the southern part of Canada. As he looks about the store, he spies a box of Northern Spy apples, some Tompkins County Kings, and some whose size, color and box label tell him that they came from the Wenatchee Valley in Washington. He sees Concord grapes from the vineyards of Massachusetts, and peaches from the Yakima Valley of Washington. Having an imagination, without which he probably would not be a globe-trotter, he is sent into a mental tailspin when he tries to decide from the fruits in the fruit store what parts of the world he likes best. And while he is in that condition, let us open the store and let him escape.

EGGPLANT

MUSKMELON

CUCUMBER

While our store door is open to let out the globe-trotter, the botanist slips in. He looks seriously around the room and sees things observed by few. Some are of interest only to the scientist, but many are of such fundamental importance that they affect us all.

Were it not for the botanists, many of the fruits would not be in the fruit store at all; other kinds would spoil so quickly that their sale price would be necessarily high; still others would lack the flavors that allow them to win and hold a dependable market. Save for the botanist, and his associate, the zoologist, the insect and fungus pests of the plants producing the fruits in our store might well have destroyed the plants and their fruits while they were growing, en route to market, or before we could get them to our homes. Certainly these serious-minded folk have solved the problems of storage and shipment as no ordinary person could. They have attended the wedding rites and played best man to many a marriage that has produced a new variety of melon. In fact they have conducted far-flung matrimonial bureaus that have introduced and brought together plants from widely separated continents in such a way that they and we can live more happily ever afterwards. These are the men who have most commonly been behind the scenes in the struggle to produce not only bigger but better fruits to satisfy the world's demands.

Should the botanist ask our fruit storekeeper for some "berries" he might refer to oranges, lemons, grapes, bananas, tangerines, grapefruit or tomatoes. He would never refer in such terms to a raspberry or blackberry. They are "drupes" or stone fruits, like the peaches, plums, dates and cherries. Of course, the drupes of the raspberries are small and are called drupelets, but each little section of a raspberry is like a little peach if you only stop to think about it. Botanists stop to think about a lot of things concerned with plants. That may be why they are more careful to be more consistent than some of the rest of us.

If you happen to be interested in what concerns our botanist friends, look up in any good botany text or dictionary the definition of such fruits as drupes, berries, achenes, legumes, capsules, nuts and samaras. Then try, in a fruit store, to find what you think the fruits displayed there may be. This will get you to hunting for all sorts of missing flower parts, some of which you will find at one end of the fruit, as in an apple, pear and pineapple, while other fruits, such as the oranges, bear them at the opposite end. Following this, or a similar line of thought, you will find that while bananas grow on plants that rise some twenty feet in the air, these are not trees or even woody plants; while strawberries and cranberries, which grow close to the ground, do grow on woody plants even though these are not trees, and that the fruits, despite the name, are not berries.

A newspaper, reporting on a meeting of the British Association for the Advancement of Science, said: "Saturday morning was devoted to pure mathematics and so there was nothing of general interest." Possibly the botanist thinks thus about the fruits in our fruit store, so we will let him out the back door because the gardener, or orchardist, is coming in the front. The chances are the botanist will be back when we need him.

This new visitor is the man who does the real job of raising the plants. It is he who puts into practice the principles that the botanists discover. He knows how to graft better than any politician, but his grafts are usually helpful to society. If he wants a fruit to grow in a kind of soil where it would not normally grow, he may graft the desired strain on the root system of a closely-related plant that likes that soil. If he wants larger fruits, he prunes his plants so that the nourishment that would normally go into two apples, or two bunches of grapes, is forced to go into a branch bearing only one. Since you probably would purchase the larger fruit, he finds a more ready market for his products than does his neighbor who does not prune so wisely.

This horticulturist is a general and a soldier all in one. He shoulders his power spray gun and goes to battle with scab, rust, scale and a hundred other foes of the plants

PEAR

APPLE

LEMON

PINEAPPLE

he is rearing. He puts boards down and traps insects under them. He carries on a poison campaign against mice that attempt to girdle his trees. If he is wise, he encourages the presence of weasels, screech owls and other animals that are the arch enemies of the mice.

This soldier of the soil may be clever and successful. He may be able to produce crops when the market is at its height by forcing methods, by greenhouse culture, or, in some cases, even by delaying crop maturing. If he has a greenhouse, he finds himself forced to pollinate many of the flowers of his plants since the insects that would normally do this are not present. This he may do by hand, with a brush, or by the simpler process of jarring the plants at intervals to assist in shaking the pollen from one flower to another, or from one floral part to another.

This nurseryman of ours cares for his charges with almost the care his wife gives his youngsters. If he is raising melons, he turns them in their beds so that all sides will be equally exposed to the sun and equally good. If he has oranges, he worries about the frosts, and, when there is danger, builds fires in his orchard in the hope that they will keep the temperature above the danger point. If he raises figs or dates, he has to be sure that pollination is effected through rather involved techniques, but he knows these tricks or he would not remain long in his business. This gardener must know when he can pick his fruit so that it will have the best qualities developed when we are ready to make the purchase. This may involve a gradual ripening of the fruit over a long period of shipping and storing. It may call for timing the ripening of his crop so that his helpers can be kept busy, rather than be idle much of the time and swamped with work the rest of the time. This man, in short, must be eternally on the job for us if he is to prosper and we are to get his fruit.

Many of these gardeners and horticulturists capitalize upon their experience and work by using trade names that guarantee the quality of their product. Of course, we pay for this, but in most cases it is money well spent. We cannot afford to buy fruits from which poison spray has not been removed. We cannot afford to buy a basket of peaches and find that only the top layer is good. We do not want oranges that have been frost bitten, or that contain dry pulp instead of tasty juice.

These men who raise our fruits, or their workers, handle them before they come to our mouths. We have a right to expect that this be done in a sanitary way and so we impose restrictions on the man who raises and processes our foods. Some of these restrictions are sensible; others may be evaded. The grower of fruits, then, should be a good citizen in addition to being a good husbandman. Generally, he is both.

The big business man comes into our fruit store without our seeing him. His products may be canned, or frozen or fresh. Unless we go to Hawaii or the tropics, we could never taste such good plant-ripened pineapples as we can get from tin cans. And a trip through one of the big canneries, with its barge-loads and train-loads of ripe fruits coming in an almost (Continued on page 452)

GRAPEFRUIT

TANGERINE

ORANGE

PEACH

COMMON NAME SCIENTIFIC NAME	DATE PALM *Phoenix dactylifera*	PINEAPPLE *Ananas sativus*	BANANA *Musa sapientum*	FIG *Ficus carica*
DESCRIPTION	Height, 100 feet or more. Trunk, shaggy, rarely perfectly straight and completely erect. Leaves, often yards long, more or less erect, loose-open-feather-like, stiff, spine-tipped. Suckers rise freely from and near the base, eventually developing roots of their own and making possible separation.	Height, to 4 feet, erect, the short stout stem bearing coarse, spiny-edged thick, closely crowded, sword-shaped leaves and at the top the fruit-forming rosette. The roots are shallow, spreading widely from the base of the plant through the soil.	A perennial herb, not a tree or woody plant. Height, to 30 feet. Trunk-like structure bears crown of erect or arching paddle-shaped leaves. Suckers produced in abundance at base one means of propagation, but these should be removed to increase vigor of bearing plants.	Soft-wooded, much branched, 30-foot tree with thick, broad, long-petioled, deeply 3- to 5-lobed, nearly round, rough leaves, which are fuzzy beneath. Roots form readily on wood cuttings similar to cuttings made of grapes.
RELATIONSHIPS AND RANGE	Class Monocotyledoneae. Family Palmaceae. Native of North Africa and Arabia but planted widely through tropical world, particularly in southern Europe and Asia and to some extent in southwestern United States.	Class Monocotyledoneae. Family Bromeliaceae. Principally in Hawaii, Cuba, Puerto Rico and formerly, to a limited extent in Florida. Has been grown, but not as a commercial success, some distance outside the tropics.	Class Monocotyledoneae. Family Musaceae. Native of India but grown extensively in the tropics. Dwarf Chinese banana, *M. cavendishii*, grown for ornament on United States Gulf Coast and in California.	Class Dicotyledoneae. Family Moraceae. Native of Asia but introduced widely through world, being grown as far north as Michigan and New Jersey with some success. Commercial plantations limited to southern states.
REPRODUCTION	Staminate and pistillate flowers on separate trees, the pollen normally being spread by wind, but more practically by hand; in this case, one staminate tree is sufficient for 100 pistillate trees. Fruits ripen over long period, some doing best after being picked and stored in warm moist situation. Seeds or suckers may be planted at any time in suitable regions.	Flowers are sterile and do not figure in the least in reproduction, though the dried remains of what might have been the stamens and styles may be found in the end of each section of the fruit. Reproduced vegetatively only.	Commercial bananas do not produce seeds. Flowers appear in erect clusters that bend downward. Plant bears fruit only once—10 to 12 months after shoot development or transplanting begins. Because of developing suckers a plantation may bear several years if free from pests.	Flowers borne inside hollow twig through an opening at the end of which the pollinating fig-wasp, *Blastophaga*, enters, after which the wood thickens, the hole may become closed, the true fruits ripen, and the whole fruit becomes mature. New varieties may be developed from seeds.
CULTIVATION AND ENEMIES	Favors hot climate but not humid air; can endure more alkali than other profitable tropical fruits and can withstand 10° F. temperature for short time but must have hot climate during fruit ripening. May survive in conditions such as are found in Salton Sea region, the Salt River Valley and the Lower Colorado Valley in the U. S., and tropical regions elsewhere.	Suckers, stem slips or fruit slips are planted shallowly 8000 to 15000 to the acre in soil that must be well drained, although water must be available. Fertilizers are commonly applied profusely. See NATURE MAGAZINE, October, 1940, page 469.	Light frost will kill leaves and prevent fruit formation but new suckers will arise and fruit may be borne succeeding year. In hot houses, bearing may not begin until shoot is 2 or 3 years old; not economical to raise under glass.	Plants must grow in heavy clayey soils that remain uniformly moist. May survive temperatures as low as 10° F., when tops usually winter-kill unless bent down and protected. May be grown successfully under glass. Roots frequently attacked and destroyed by nematodes, causing plants to starve.
FOOD VALUES AND IMPORTANCE TO MAN	Food value high in nutriment, and has served man as food through the ages. Seeds sometimes roasted and used as coffee substitute, or pressed for oil and the pomace used for stock food. Sugar made from sap. Valuable in providing shade in tropics for other plants. Annual U. S. imports in excess of $500,000. Individual fruit clusters may weigh twenty to thirty pounds.	Fruits, rich in sugars when ripe, but plant-ripened fruits not available except where plants grow, as the fruits must be cut one or more weeks before maturing. Fruits to be canned may be fully ripened before harvesting. Hawaii provides 75% of the world's canned pineapples and most of the fresh product for the Pacific coast; eastern fresh fruit comes from West Indies, particularly Puerto Rico. Canning fruit and juices, and shipping fresh fruit, make the industry "big business".	Fruits picked and shipped green may be eaten raw; related plantain inedible unless cooked. Vitamins B and C present. Banana flour is made by drying ripe bananas. Plant provides cheap food in tropics and is among most important tropical foods. First introduced into the United States in 1804 and the first full cargo of 1500 bunches delivered in New York in 1830. Plantain less important commercially.	Fruits, rich in palatable and nourishing sugars and act somewhat as laxative. Harvested figs dried or preserved in syrup, or eaten fresh. Figs grown commercially in the southern states where the soil and humidity are suitable. Louisiana, Texas and California are the leading producers.

GRAPEFRUIT *Citrus grandis*	ORANGE (1) Sweet. (2) Sour. *(1) Citrus sinensis;* *(2) C. aurantium*	TANGERINE Mandarin *Citrus nobilis deliciosa*	LEMON *Citrus limonia*	APPLE *Pyrus malus*
Trimmed to rather strong, low tree with slender, rather dull spines, which may be lacking. Twigs, finely furry, greenish. Leaves, to 6 inches long with broadly-winged petiole, those on young shoots tapering to a blunt point. Root systems well developed.	Because of pruning, low, open-headed tree with *few spines* (1); and with long sharp spines in (2). Wing of leaf petiole narrow in (1) or wanting; broad in (2). Leaves lustrous, waxy green, to 4 inches long borne alternately on rubbery green twigs. Wood, uniform, hard, light colored.	Good-sized tree with leaves of the mandarin variety narrower than those of the tangerine, narrower than orange leaves; with wings on the petioles. Has been developed in many varieties. Tree of mandarin smaller than of tangerine.	Small, smooth tree bearing stiff, short thorns; 2- to 4-inch slightly shining, rather blunt, petioled leaves, the petioles bearing narrow margins. Wood, uniform, light colored and relatively hard. Trees kept to below 10 feet high commonly.	Many-branching tree, up to 20 feet high, with alternate leaves and special fruit-bearing spurs which also bear leaves. Leaves, to 4 inches long, darker above than beneath, coarse-veined beneath, short-petioled. Roots, both shallow and deep.
Class Dicotyledoneae. Family Rutaceae. Native of Asia but planted widely, particularly in Florida, California, and Texas and Louisiana on light, well-drained sandy, fertile soils. The Duncan variety is among the more hardy. The Marsh is a common California variety. Texas features "Pinks."	Class Dicotyledoneae. Family Rutaceae. (1), native of China but established widely in suitable climates and introduced into America largely from Mediterranean region. (2), native of Asia but naturalized in Florida and elsewhere.	Class Dicotyledoneae. Family Rutaceae. Native of Asia but introduced through world in same general areas where oranges may be grown.	Class Dicotyledoneae. Family Rutaceae. Native of Asia but introduced widely through parts of world where temperature does not go below 29° F. for any considerable period. Apparently succeeds best in California. Three common varieties recognized.	Class Dicotyledoneae. Family Rosaceae. Native of Europe and Asia. Many varieties developed and introduced where climate is suitable throughout the temperate zones of the world. Can exist in a variety of well-watered, well-drained soils. Commonly bear better every other year. Fertile soil increases fruit yield.
Flowers solitary or in axillary clusters, 1 inch long, with large, white petals and 20 to 25 yellow stamens, develop fruits about 6 inches through of about 12 segments, pale yellow, with thick rind and sour. May be propagated by seedlings or by budding on seedling stock.	Flowers, over 1 inch across, waxy white with yellow stamens, exceedingly fragrant, borne through the year but more abundantly at different times according to variety. Fruit of (1), sweet; of (2), sour, about 3 inches through. The "navel" oranges have irregular divisions of fruit at free end.	Flowers, small, white and developing the flattened reddish orange fruits from which the rinds may be peeled most easily and cleanly and in which the sections may be readily separated. Closely related to the Satsuma orange and the King orange.	Flowers, solitary or clustered in axils of leaves, pinkish outside and whitish inside, to ⅔ inch long with 20 or more stamens; insect pollination produces oval fruits nippled at the ends, sour, of 8 to 10 segments and with thick spongy skin.	Flowers, with 5 sepals, 5 petals, many stamens and fruit of 5 parts grown together. Pollination by insects, principally bees in mid-spring, fruits maturing from mid-summer to late fall, depending on the variety.
Fruits held late on the trees may sprout their seeds and injure flavor of fruit. More susceptible to cold than most other citrus fruits. Begins bearing at 3 years and reaches full bearing at 10 years. Grows better on poor soil than do oranges.	Propagated by shield budding on same or other related species. Must have water equivalent to annual rainfall of about 40 inches, some of which may be supplied by irrigation, although 25 inches should be by precipitation. Fertilizers strong in phosphorus and potash are usually added about three times a year.	All oranges are susceptible to many insect and fungus diseases and pests, including scale insects, thrips, mealy bugs, mites and gum disease and various rots. Protection against frost effected by fires; sprays, beneficial insects, proper fertilizer and pruning help care for many of the other problems. Appearance is important in marketing all oranges and so their culture is a serious problem.	Commonly grown grafted on sour orange stock. Fruit picked and packed by gloved hands through year but more particularly in winter months, when fruits reach a diameter of 2¼ inches. Lemon is hardier than lime and less hardy than the orange.	Propagated by slip-grafting on seedling root systems and on established trees. Attacked by scale insects, codlin moth, many aphids, red-bugs, tent caterpillars, meadow mice and many fungi. Sprays help control insects and fungus pests and destruction of neighborhood red cedar helps control apple scab affecting some varieties.
Fruit, rich in vitamins B and C; lower in calcium and in most minerals than oranges or lemons; also lower in protein. Introduced commercially into United States about 1809 and now one of major citrus crops of the country, particularly in Florida. Many varieties, including the pink-fleshed Foster and Thompson, have been developed and added to popular appeal.	Raised for food by man, the juice possessing vitamin A; vitamin B in considerable amounts; and vitamin C in large amounts; rather high in protein for fruits. (1) is produced in quantities surpassing all other American citrus fruits, being less hardy than (2), it is not raised so far north; by selecting varieties a yield through the year may be maintained. 6.8 ounces equal 100-calorie food portion.	Food value probably comparable to that of oranges. Tangerines do not keep in markets so well as some other oranges. Their abundance of seeds often counteracts their popularity because of less ease ot eating. Frost damage makes oranges dry. Orange and tangerine canning not developed to extent of grapefruit canning.	Vitamin A absent or nearly so; B, present in considerable amounts; C, in large amounts in the fruit juice. Useful in flavoring many foods and drinks and to some extent medicinally. One of the more important staple citrus fruits too sensitive to cold to be raised over long periods in much of Florida. Lemon is less resistant to important fungus diseases than orange or grapefruit and losses may occur because of this.	Fruits vary greatly in flavor, texture, size and keeping properties; have depression at both ends; rich in Vitamins B and C. A major fruit industry of the United States. Storage at 29° F. prolongs keeping qualities. Orchard may bear in 4 years, and produce up to 15 bushels by tenth year, and to 50 bushels per tree, or 500 bushels per acre, in best years of maturity.

COMMON NAME SCIENTIFIC NAME	PEAR *Pyrus communis*	PEACH *Prunus persica*	PLUM (1) Domestic; (2) Japanese; (3) American *(1) Prunus domestica;* *(2) P. saliciana;* *(3) P. americana*	GRAPE *Vitis*
DESCRIPTION	Tall, usually pyramidal, long-lived tree, commonly less open than the apple. Thorn-like spurs common and bear short-pointed leaves up to 4 inches long, which have finely cut margins, coarse veins and usually dark green upper surfaces. Roots, relatively deep.	Low, weak, short-lived tree, with colored, smooth-barked, rather rubbery twigs. Leaves, to 9 inches long, smooth, shining above, lighter beneath, alternate, taper tipped and with glands common on the petioles. Ornamental varieties are purple-leaved.	Relatively large, open trees with young twigs of (1), mostly fuzzy; of (2), mostly smooth and of (3), either smooth or fuzzy. Leaves, alternate, of (2), with finely cut margins; of (3), with coarsely cut edges. Root systems deep. Wood, hard and durable.	Heavy vine, climbing by tendrils, rooting freely with contact with the ground and bearing large leaves as broad as long on long petioles, alternately, to 8 inches broad on vigorous shoots, fuzzy beneath and dark green above.
RELATIONSHIPS AND RANGE	Class Dicotyledoneae. Family Rosaceae. Native of southeastern Europe and southwestern Asia but introduced as a cultivated tree widely throughout the world. Asian pear native of China.	Class Dicotyledoneae. Family Rosaceae. Native of China. Grown in United States and southern Canada where temperature does not go below 15° F. below zero. A tree may yield to four bushels of fruit and an acre may produce to 250 bushels a year but the financial return varies because of market conditions, storm damage and judgment in harvesting.	Class Dicotyledoneae. Family Rosaceae. (1), native of Europe and grown extensively in western states; (2), of Asia, introduced more widely than (1); (3), of America, with popularity in central and southern states.	Class Dicotyledoneae. Family Vitaceae. Cultivated grape hybrid of a number of species grown over greater part of North America except in extreme north. Concord from native fox grape. Many other hybrids, some with European grape.
REPRODUCTION	Flowers usually white or pinkish appearing with the leaves, about 1 inch across, 5-petalled, 5-sepalled, self-pollinated if not visited early by such insects as syrphid flies, house flies, honey bees and other insects. Fruit matures from August to late fall depending on variety.	Flowers beautiful, solitary, pinkish, to two inches across appearing before the leaves and pollinated by bees and other early season insects or sometimes self-pollinated. Fruit, with hard central stone surrounded by delicious flesh and thin, soft, furry skin.	Flowers, few to a bunch, appearing with leaves or before them, attractive, white, 1 inch across, fragrant, attracting bees, syrphid flies and other insects, which assist in pollination but may self-pollinate if no insects visit. Fruit, commonly, blue-purple.	Flowers, relatively inconspicuous, borne about time of leaves from strongest buds and at the base of the current year's growth. Flowers like small greenish cup actually or functionally either staminate or pistillate. Fruits, soft, pulpy berries.
CULTIVATION AND ENEMIES	Commercial propagation is by seeds or imported seedlings, not more than four rows of one variety recommended. European varieties do not do well north of United States. Fruits for market or home storage are hand picked and most should be eaten soon, although Bartlett pears may be held 3 months at 30°F. Codlin moth and fire-blight among more serious enemies.	Many insect and fungus pests, particularly the peach borer. May bear in third year after planting and continue until 12 years old, the yields commonly being greater every other year. Favor well-drained, warm, sandy or clay loams.	Commercial propagation commonly by budding on a variety of stocks, depending on soil and other requirements. Hardiness secured by grafting desired varieties on American stock. Pests include curculio and brown rot, controlled by lime-sulphur and lead arsenate dry mixture.	Pruning commonly cuts canes back to 8 or 10 buds each, with 3 or 4 canes to a vine, with most 2-year and 3-year-old wood cut away. In East, commonly trained to 2-wire trellises. Vines may produce to 60 bunches, 20 pounds. Plants diseased by fruit rots and mildews, controlled by Bordeaux mixture, and by grape root worm, controlled by lead-arsenate.
FOOD VALUES AND IMPORTANCE TO MAN	Fruits, rich in sugars, gritty, soft when ripe and eaten by many animals. Vitamin B present in good quantity. Some 30 commercial varieties grown in America, some producing to 400 bushels of fruit per acre if fertilized, pruned and cared for properly. Commonly grown for home and immediate use on farms with apple orchards.	Fruits vary in flavor, lasting quality and size, are generally picked before ripe for shipment but are best for canning when tree-ripened. The nectarine is a peach variety with a skin smooth like that of the plum. More than 50 common varieties suited to different climates and soil and water conditions.	Over 30 varieties recognized. Properly cared for, a plum tree in the east may bear 1 to 4 bushels; more, in the west. The common prune is (1); dried, it makes an important article of commerce and in the breakfast diet. For home use, fruits that are soft are hand picked. They are rich in sugar and may be canned or are made into jam or dried, usually after ripening on the tree if possible.	Fruits with considerable vitamins B and C. Four and eight-tenth ounces equal 100-calorie food portion. Yield may be as much as 5 tons per acre. Grapes sold fresh, for extraction of juice or in some varieties like raisins, dried. In latter case, equals food portion.

TOMATO *Lycopersicon esculentum*	EGGPLANT *Solanum melongena esculentum*	RED PEPPER *Capsicum fruticosum*	CUCUMBER *Cucumis sativus*	MUSKMELON *Cucumis melo*
Length, to 6 feet, spreading annual, or if sheltered, perennial, the young plants and young growth erect. Strongly odorous. Leaves, compound, to 18 inches long, with leaflets to 3 inches long, with incurved margins. Will root at joints.	Herb, growing to 3 feet high, with oblong leaves to 15 inches long, thick, heavy, coarsely angled or lobed; bushy. Perennial, but grown mostly as an annual. Roots, branch freely.	Shrub, to 8 feet high but in North commonly grown as annual. Wood, hard, trunk 3 inches through. Whole plant tender when young. Leaves, varying to 5 inches long, usually pointed at each end. Roots, much branched.	An annual, tender, trailing vine, with angled stem, with stiff, rough hairs. Leaves, to 6 inches long, somewhat 3-lobed and about as wide as long. Tendrils help vines climb over low trellises or on wires in greenhouses.	Trailing vine, soft-hairy, with angled stems. Leaves, to 5 inches across, rounded at the tip and not distinctly lobed. Annual. Two major American groups, netted or nutmeg melon and cassaba or winter melon. Name "cantaloupe", erroneously applied to netted, really belongs to melon with hard rind seldom grown in America.
Class Dicotyledoneae. Family Solanaceae. Native of South America. Now grown throughout the world where climatic conditions are suitable.	Class Dicotyledoneae. Family Solanaceae. Probably a native of India; grown in America as far north as New York, but more particularly in the South.	Class Dicotyledoneae. Family Solanaceae. Native of Central and South America; one related species from Japan.	Class Dicotyledoneae. Family Cucurbitaceae. Native of South Asia but introduced throughout world where climate is suitable and pests are controllable or absent.	Class Dicotyledoneae. Family Cucurbitaceae. Probably originated in central Asia. Requires open, fertile, sunny soil. Many varieties suitable for various uses.
Flowers, in clusters of 3 to 7 to nearly 1 inch across, on jointed stalks and producing red or yellow, flattened spheres or fruits to 3 inches through. In greenhouse, pollination may be effected by jarring plants once a day. Late varieties may be picked green and ripened on shelves, or entire plant hung up by roots indoors.	Flowers solitary, opposite the leaves, violet, disc-shaped, to 2 inches across, pollinated by insects but under cultivation best pollinated with man's help, thus assuring development of large fruits, which may mature 120 to 150 days after seed planting.	Flowers small, to ½ inches broad, usually 5-lobed, developing well-known, many-seeded, thick-rinded berry, which differs in shape with variety. Large fruits can be produced by pinching off growing tips of plant. Seed packet contains about 200 seeds, many more than enough for a family.	Flowers, to 1½ inches across, with staminate flowers often in separate axils. Hand pollination in greenhouses common. The fruits are greenish white when harvested and commonly bear short, prickly elevations. Seed to seed, in 65 to 90 days. Fruits do not keep well unless pickled.	Flowers, about 1 inch across with stamens in more than one axillary flower. Corolla margins, like rounded teeth. In greenhouses, pollination by hand. Fruits of many varieties with fragrant rind usually yellow, green or flesh colored and musky in odor. Mature, 90 to 100 days from planting.
Plant thrives best where night temperature does not go below 60° F. Overwatering of plants under glass a common fault. Leaf-spot a common disease but most pests controlled by fall cleaning of trash in the garden.	One ounce of seeds may produce to 2000 plants. Potato beetles, red mites, and a number of bacterial and fungus blights act as serious enemies, particularly in greenhouses. Temperature of soil should be 65 to 70 for at least a month.	Relatively free of insect pests in the field, but red mites and aphids attack in greenhouses. One may be "burned" by handling peppers with naked hands. Water will not help such "burns", but milk will. Paprika comes from long pointed varieties.	Usually planted in hills after frost danger and thinned to 3 plants per hill. Soil must be kept loose. Plants eaten by many insects, particularly the cucumber beetle. Mildews controlled by Bordeaux spray; squash bugs by kerosene emulsion and traps; aphids, by nicotine dust application.	Grown in drier warmer regions and in greenhouses, one vine producing 3 to 4 full-sized fruits. Striped cucumber beetle is probably worst pest and is kept away with mosquito netting covers and by sprays. By forcing in greenhouses, November crop may be planted in July. Should be dry during ripening season.
Fruit contains much vitamin A and more vitamins B and C. One pound of fresh tomatoes equals 103 food calories, ½ ounce of carbohydrate and 1 ounce of protein. A plant may produce 4 to 6 pounds of fruit or 12 tons to an acre; one bushel weighs 50 to 60 pounds. Sold fresh to canneries or market, and constitutes a major garden crop. In fields, grown in rows 4 feet apart.	Food value of 1 pound equals 12 calories. A dozen plants should supply an ordinary family. A number of popular commercial varieties include New York Purple, Black Beauty and Black Pekin. Fruits may be eaten at any stage but larger ones bring better price. Culture, a specialty.	Food value of 13 ounces about 100 calories. Merit lies in appetizing properties rather than in value of fruit itself. Large Bell peppers are mildest and are used as "stuffed peppers". Has some commercial value, yielding in different parts of the country from $60 to $300 per acre, depending on the market and ability of gardener to raise superior products at right time.	One pound yields 68 food calories and .39 ounce of carbohydrate. Possibly fair as a source of vitamin B, but little of any A or C. One ounce of seed enough for 50 hills. One plant may yield 100 cucumbers which weigh about 50 pounds to the bushel. Important crop for fresh fruits and for pickles. Acre may produce 100 bushels of pickling cucumbers.	Food value of fruit: 1 pound produces 180 food calories and only about ½ purchased weight useful. Fair for Vitamin B. Used chiefly as appetizer. Valuable garden and field crop that has become almost a standard breakfast appetizer. Soil and weather requirements and culture practices limit production to certain areas and by specialists, if work is on large scale.

(Continued from page 447) endless stream, makes one realize that here is one of the most carefully-organized industries. Yet wherever fruits are raised, great amounts go to waste. Apples, pears and cherries rot on the ground of the northeast; peaches and apples, in the northwest; oranges and raisins and prunes, in the southwest; and grapefruit, oranges and tangerines, in the southeast. These wastes might save thousands of lives if they could be properly distributed on an economic basis. The government has attempted to dispose of these surpluses to those on relief, by different methods, and with varying success.

The relatively new practice of freezing certain fruits for storage has opened a whole new series of problems for the horticulturist and for the merchant. I have seen great fields of luscious strawberries wasting, although freezing equipment was available. Political economists had decided that this particular area had already produced its quota for the year. Somehow, it seems as if such matters might be better handled.

The difficulty of freezing fruits for storage is being overcome. Small private freezing plants are now available for use on individual farms, or for small communities of farms. These may rival in importance the advent of refrigerator cars and ships, which now bring all sorts of foodstuffs from the tropics to colder markets.

Where fruits are stored or shipped unfrozen, a host of problems arise. Fruits are essentially living things; still give off some of the gases that they did on the plant and these cause spoilage. Any bruises will provide a point of entry for disease organisms. They may shrink because of loss of water. Despite properly humid air molds may result during transit. So we find that fruit has a tremendously complicated history. Our business man has a perishable crop that must be quickly marketed far away. The engineers, called in to improve shipping and storage equipment, depend on the plant physiologists, who, in turn, look to the chemist. All these must recognize the authority and the claims of the social scientist, and, to some extent, the ignorant politician.

So we find that the big business man brought many others into the store, but there are two more who are waiting to get in. One of these is the aproned dietician who thinks in terms of calories, vitamins, iron, and so on. The other is the whimsical buyer—the one that all the rest must please.

Our dietician says that about 15 per cent of the heat-producing units in our food should come from fruits and vegetables. Normally she looks to fruits more for appetizers and for vitamins than for calories. Prunes, dates, figs and raisins are considered excellent sources of the carbohydrates, which give us energy. Bananas, peaches, apples, grapes, pears, plums and muskmelons are good for this purpose, and grapefruit, lemons, and oranges are only fair. Pineapples and tomatoes are from poor to fair.

Most of the common fruits are poor as sources of bone-building calcium. This comes from milk products and from some of the greens. Fruits are also generally poor sources for protein, the flesh and blood builder, and for phosphorus, which helps develop and build nerves, bones and teeth—this last in spite of much commercial advertising. Fruits are useful in giving bulk to a meal, as well as for providing the regulatory vitamins. These last elements are essential to good growth and health at all ages, and so are a necessary part of the normal diet.

Vitamin A, essential for the normal adaptation of the eye to darkness, for successful reproduction, and for the production of the enamel of the teeth, is found in goodly quantities in pimento peppers.

Vitamin B is essential for a normal appetite, for a proper functioning of the digestive tract, and for successful reproduction and lactation. It is best found in tomatoes, although it is present in considerable amounts in apples, grapefruit, lemons and oranges. It is not easily destroyed by cooking, but it is soluble in water—thus much of it may be discarded in the water in which apples or tomatoes may be cooked.

Vitamin C, ascorbic acid, is good for the teeth and for normal blood vessel walls. Its absence slows up the healing of wounds, and causes bleeding gums, and fleeting pains in the joints. It is this vitamin that many of our fruits provide in a superior way. Thus came lime juice to the British navy and merchant marine to prevent scurvy. Grapefruit, oranges, lemons, limes and tomatoes supply this vitamin in generous amounts. Unfortunately for us, Vitamin C is the most easily destroyed of them all. Long cooking, exposure to the air, drying, the addition of soda in cooking—all tend to destroy it. Except in the case of tomatoes and the citrus fruits, canning normally reduces or destroys it. Frozen fruits, however, retain it well.

Vitamin D, associated with rickets, is not found in generous amounts in fruits. Nicotinic acid, whose absence may cause the disease pellagra, may be found in tomatoes, and cooking and canning have little if any effect on the amount.

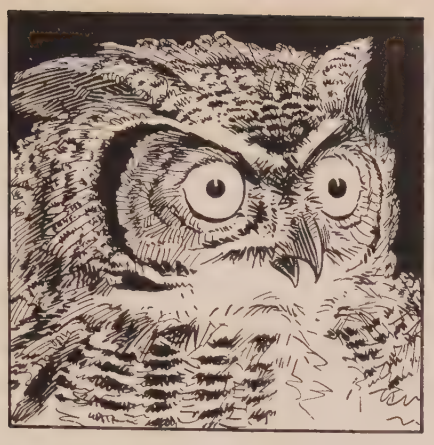
Riboflavin, essential in growth, whose absence may be indicated by sores on the lips, occurs in goodly amounts in apricots and tomatoes. It is not easily destroyed by exposure or by ordinary cooking practices.

The ordinary purchaser is influenced more by appearance and by price than by food value, geographical source, botanical uniqueness, or keeping qualities. If it is something that fashion or the radio has declared to be "the thing this year" no salesmanship is necessary.

But there is no need to be misled. The Federal government, colleges of agriculture and of home economics, food charts, and bulletins tell of raising fruits. Anyone interested in any of the problems regarding fruits, may drop a card to the nearest experiment station and receive a host of useful suggestions that could not be discussed satisfactorily in a limited article.

There are some splendid general references, such as Liberty Hyde Bailey's *Hortus* and his *Standard Cyclopedia of Horticulture,* and Hedrick's *Cyclopedia of Hardy Fruits.* And you will find that commercial concerns issue beautiful brochures on the fruits in which they specialize. With these helps, it is not difficult for anyone to build up a creditable library in a short time about the stock in a fruit store.

As We See It



PROGRESSIVE FORESTRY

A half-century anniversary in American forest conservation history is being observed this year. Fifty years ago the first "forest reserve" was established in Wyoming. The national forest system was this country's first real achievement in conservation; it saved millions of acres of public domain timber from unprincipled speculators, and it has developed into the world's outstanding public forest enterprise.

It has become increasingly apparent, however, that development of the national forest system was only a beginning in the conservation movement. The bulk of the nation's forest lands—and the most productive—remain in private ownership. These lands are still subject to unrestricted exploitation and misuse. The annual drain on our forest resources exceeds the rate of growth. The public's interest in watershed protection and in maintenance of permanent timber supplies is not being protected.

The recent report of the Joint Congressional Committee on Forestry brings attention to this problem of privately-owned forest lands. Following a three-year study, the Committee recommends a comprehensive program of forestry that should help materially in restoring and perpetuating our forests. It recommends increased federal aid in fire protection and a number of other cooperative aids to private forest land owners to help them operate on a continuing or "sustained yield" basis. Its two most important recommendations are for a system of public regulation or control over timber cutting, and for expansion of publicly owned forests.

Some 77 million acres of once-productive forest land in this country—an area equal to all of New England plus New York, New Jersey, and Delaware—is now largely a cut-over and burned-over waste. Millions of acres more are producing but a fraction of what they should. Such lands are a liability; run-down lands mean run-down people. For the bulk of these lands it is only through federal acquisition and management that we can hope for their rehabilitation and restoration to the asset column. It is encouraging that the Joint Congressional Committee has recommended government purchase of lands for national forests. Our only regret is that its recommendations on this essential part of our conservation program were not more emphatic.

Meanwhile, are we going to allow unrestricted cutting in our remaining private timberlands to continue the process of devastation that has already converted these millions of acres to wasteland? Conservationists have long been saying "there ought to be a law." The Joint Committee says there ought to be a law. It proposes regulation of forest use under state laws but provides no guarantee that the States will enact or enforce such laws except a threat of withdrawal of certain federal aid funds. This would jeopardize other important conservation work, especially in those States least able, financially, to carry out state conservation programs.

Let's have a real anti-devastation law—a forest regulation law backed by the power of the federal government, that will outlaw forest destruction and require timber cutting to be done in such a way that continuous production will be maintained. And let's lock the door before more horses are stolen.

It can be expected that powerful lumber industry lobbies will fight such a law in Washington. They probably won't like it—but the public, which pays the bills brought on by forest devastation, will.

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SAVE FORT CLINTON

Although many New Yorkers may consider it a local matter, the fate of the Aquarium Building in Gotham's Battery Park is really of national importance and interest. This is proved by the nationwide protest that has already arisen against the proposal to raze this historic building. And this is not surprising in view of the fact that more than two and one-half million people visit the Aquarium every year, a relatively small percentage of them native New Yorkers.

This building has been an aquarium for forty-five years. As such it has served its purpose adequately. However, the collection of marine life there could as well be housed in a specially-built, modern aquarium building, and is to be. But such a shift by no means justifies the destruction of the present building.

One hundred and thirty years ago Fort Clinton was

completed to defend New York in the War of 1812. Conveyed to New York City by the Federal Government in 1822, it became Castle Garden. There Lafayette was welcomed in 1824. The following year it was to be the first public building to be lighted by gas. Many receptions for notables were held within its walls. Jenny Lind sang there, and it was the forum for many meetings significant in the history of New York and America.

The bombs of war are reducing to piles of char and rubble historic landmarks in Britain and Europe. Such treasures are irreplaceable. Fort Clinton is such an historic landmark. It would be a simple matter to strip it of its present stucco coating; restore it to its original state; make it a museum of a past that, these days, should be recalled to Americans at every turn.

The only excuse for levelling the Aquarium Building is that it will interfere with re-planning Battery Park. We cannot feel that this is sufficient reason for sacrificing an historic landmark. If you agree, The New York Historical Society, 170 Central Park West, New York City, would be delighted if you would write and tell it so. Public sentiment can save Fort Clinton—and should.

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KEEP THE MINES OUT

Within our memory no issue has so unified conservationists —individually and collectively —as has opposition to the Hayden-Murdock Bill "to permit mining within the Organ Pipe Cactus National Monument in Arizona." This undoubtedly arises from the questionable character of the proposal, and from an aroused sentiment for the protection of National Parks and National Monuments against unjustified exploitation in a period of emergency.

The Organ Pipe Cactus National Monument comprises three hundred thousand acres of outstanding Sonoran Desert country. It supports several bands of desert bighorn sheep, a species seriously in need of protection. Its flora is unusual and its significance as a biotic community unsurpassed. It is, therefore, properly a National Monument.

The proposal for permission to mine within the area is unjustified by facts. Prospecting and mining carried on before it achieved its present status proved futile. No evidence has been presented to indicate that it holds mineral deposits of commercial value, emergency or otherwise.

Letting down the barrier in this case would seriously affect the wildlife and plant life in the area. It would prevent the development of a normal population of game animal life. It would increase the difficulties of protection of the area.

Even more important than these considerations, however, is the trend that this bill represents. As a people we have wisely set aside National Parks and Monuments for posterity. We have protected them against improper exploitation. We have made them wildlife sanctuaries where Nature is king. We have built up a wise policy with respect to them. We cannot permit such invasions of these areas as the Hayden-Murdock Bill seeks to make unless it may be proved to be unquestionably in the public interest. This immediate proposal is quite the contrary.

The Hayden Bill, S. 260, has already passed the Senate; but the companion Murdock Bill, H.R. 2675, is still pending before Congress. See to it that your Congressman and Senator know that you stand for the protection of National Parks and Monuments.

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Conservation Comment

Peace at Hawk Mountain Sanctuary is the title of a stimulating booklet that describes the success of a practical conservation project and presents an example to others. Up to seven years ago Hawk Mountain, near Drehersville, Pennsylvania, was annually the scene of a senseless slaughter of valuable hawks and eagles, which, due to the vagaries of air currents, passed on their migratory flights. Then Mrs. C. N. Edge of the Emergency Conservation Committee acted. She leased the mountain, fought the "sportsmen" who resented loss of their "sport", finally acquired the 1401 acres of mountain top and turned it over to the Hawk Mountain Sanctuary Association. Since then more than 22,000 people from forty states and a dozen foreign countries have visited the sanctuary, including no few local men who shamefacedly admit that they had taken part in the earlier slaughters. These visitors have come to enjoy the thrill of the migratory flight and to meet other conservationists. The Sanctuary is now open for fifteen weeks, but since it is rich in geological interest, as well as for its birds and flora, it should be a year-around haven. One has only to read this booklet to understand why. We suggest that you send ten cents to Dr. Earl L. Poole, Treasurer, Hawk Mountain Sanctuary Association, Reading Public Museum, Reading, Pennsylvania, for a copy.

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Seventeen American republics, including the United States, have now signed the Inter-American Convention on Nature Protection and Wildlife Preservation, recently ratified by the United States Senate. The treaty calls for the establishment and extension of national parks, Nature areas, and similar reservations that will preserve natural wonders, exceptional scenery, or places of outstanding his-

toric or scientific interest. It also provides for the protection of wildlife in such areas, and it is hoped that it will check the inroads into the numbers of migratory species that travel back and forth between the two continents. This treaty is a definite and hopeful step forward, but it must be remembered that among the masses of the people in Central and South America the attitude toward wildlife conservation is about what it was in the United States fifty years ago—and we ourselves still have a long way to go.

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In order to preserve from billboards and other undesirable commercial exploitation the environs of the Blue Ridge Parkway, the National Park Service has successfully used the policy of purchasing scenic easements from owners of abutting property. This affects in no way the use of the property for its normal farm purposes, but does provide control of the leasing of parts of it for billboard display, or for the purposes of roadside enterprises.

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With the appropriation of $1,500,000 by the Texas Legislature for the purchase of the necessary lands, creation of the Big Bend National Park on the Texas-Mexico border moves toward actuality. This area is the last great wilderness in the Lone Star State and an extraordinary example of rugged, unspoiled country. The area designated for inclusion in the park contains 788,682 acres and would make it the fifth largest National Park.

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Wild Ducks is the title of an attractive booklet issued by the American Wildlife Institute, Investment Building, Washington, D. C. Colonel H. P. Sheldon of the United States Fish and Wildlife Service has written an entertaining story of waterfowl and wildfowling, and Frederick C. Lincoln contributes the story of their migratory habits. This text is adorned by sixteen color plates by Fred Everett, these plates being supplemented by concise life history facts on each bird and a small distribution map. This is a good guide to the ducks, either for duck hunter or bird lover. It is to be hoped that it will serve to instruct some hunters in knowledge of the species to the end that, if they are true sportsmen, they will restrain their trigger fingers when the gun is pointed at any one of the seriously reduced species. Copies of the booklet are available from the Institute at twenty-five cents.

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New Forest Frontiers is the title of a most effective publication brought out by the United States Forest Service, setting forth pictorially, with brief text matter, the importance of forest conservation and restoration in this country. Through picture and occasional graph the economic, social and recreational significance of the forest is presented in outstanding fashion. This booklet is, in fact, an example of how much government publications have progressed from those of a few years ago which presented facts in such unattractive manner, both physically and textually, that they served little purpose. This booklet should be particularly valuable in schools. It is Miscellaneous Publication No. 414 and is available from the Superintendent of Documents, Washington, D. C., for thirty cents.

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Beset by the complications of war, Jack Miner is in need of assistance in carrying on his work at the Jack Miner Bird Sanctuary at Kingsville, Ontario. He is appealing for 15,000 dollars, which represents the bare cost of maintenance and bird feeding. His work merits support.

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Two recent publications of practical value in connection with wildlife management are *Plants Useful in Upland Wildlife Management* by W. L. McAtee, and *Wildlife Management through Soil Conservation on Farms in the Northeast* by Frank C. Edminster. The titles of both are descriptive. Both are available from the Superintendent of Documents, Washington, D. C., for ten cents each.

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Looking to the future, the Masonite Corporation, manufacturers of wood fiber products, has completed its fifth year of annual free distribution of pine seedlings to members of 4-H clubs and the Future Farmers of America in twelve Mississippi counties. Five and one-half million seedlings have been distributed for planting since the program was undertaken.

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Although bighorn sheep once flourished in most of the mountain ranges of the West, there are not, today, according to the Fish and Wildlife Service, more than 14,000 of these animals. They are making their last stand for existence in twelve states. Various factors have caused the decline, although the gun is the most important since the sheep have been the victims of extensive overshooting to provide trophies. Once reduced in numbers in this fashion they are far less able to withstand the inroads of illegal hunting, competition from other big-game animals, disease and predators. While the majority of the bighorns now enjoy protection through one or another Federal agency, scientists will not venture an assertion that the species will survive.

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Reports from Canada through the Canadian Resources Bulletin indicate generally good conditions for waterfowl, with an early spring bringing some species north ahead of the usual schedule. It is noted, however, that the small increase in numbers above the 1940 figure "indicates that the take of sportsmen during the 1940 shooting season was almost equal to the year's crop of wildfowl."

SENOR SUTO

By VICTOR WOLFGANG von HAGEN

SENOR SUTO DINES DAINTILY
Offered a grub, he takes it gently from the hand of his native owner, Elvia. This cousin of our raccoon is noted for his long and busy nose, which seems insatiably bent on exploration. His tail is also most expressive. This is the brown coati of Panama. It is known to scientists as *Nasua narica*, and Mexicans call him *pisote*, which they shorten into Suto. The coati makes an interesting pet, its dog-like qualities making up for its mischief. Photographs by the author

SENOR SUTO is a Latin and a cousin of our northern raccoon. As he lives in the tropics, Senor Suto has an expressive nature. It is not so much his short, thick-set body, with feet that turn in "pigeon-toed" when he walks, that distinguishes him from the raccoon, or his black face and spectacled eyes. Senor Suto's main asset is his long inquisitive nose, and a ringed tail that moves up and down like a pump handle in expressing his interest. He is known to the Mexicans as *pisote* and as *tejon,* or raccoon. He also goes by the name of coati mundi, and is known to scientists as *Nasua narica.*

Suto, whether alone or in packs, combs the jungle floor, sticking that long, mobile, flexible nose in the ground, under logs and under the bark of trees. This dog-sized mammal is just as much at home in the tree tops as he is on the ground, and he is just as happy when munching a thick beetle grub, a black, hairy tarantula, or a ripe banana. That is what makes Senor Suto a cosmopolitan.

If he has a virtue it is persistence. Once the tantalizing fragrance of a ripened fruit, or the scratching noise of an insect reaches that long mobile nose or his small sensitive ears, he will burrow, climb, or dig until that which first attracted him has been pulled down, unearthed, or used as food.

Suto (short for his Mexican name, *pisote*) makes an excellent pet. He is inquisitive and mischievous, but he makes up for all of these by his dog-like qualities. He will follow his adopted master into the forest—without halter—will come when called, and like many another four-footed animal, he will be pet and pest in turns.

In captivity the coati is found to have a varied appetite and to be far from finicky at meal times. Fruit is a favorite with this interesting animal. One will take an apple in its paws and sit up and eat it with great gusto. Other items on the menu may include chopped fresh meat, cooked vegetables, bread with sugar or syrup on it, or a bowl of bread and milk. The coati will search around in the food offered for that part that most appeals, the long, rubbery nose being excellent for such gustatory explorations.

But make no mistake about it, Senor Suto is independent, and expressive in his likes and dislikes. Alone in the forest he could easily rout a dog, and all animals give the coatis traveling in packs a wide berth.

AT THE MONTANA CONSERVATION CAMP OF THE 4-H CLUB
Members are learning to identify specimens of trees and flowers that they have collected on field trips into the surrounding forests

Nature Study on the Farm

By CLARA BAILEY

Photographs from U. S. Dept. of Agriculture

FARM boys and girls live close to Nature. They live and work with farm animals and the growing crops. As they work and play in the fields and woods, they learn to know and love the birds that nest in the familiar trees, and the small animals that live in the woods. Farmers sometimes overlook the needs of wildlife in their desire to work more land, but not so the farm boys and girls. They eagerly welcome any information about the wild plants and animals in their neighborhood, as is shown by the enthusiasm for Nature study and conservation projects in 4-H clubs.

Almost a million and one-half boys and girls are enrolled in the 4-H clubs organized by the U. S. Department of Agriculture, the State Agricultural College and the local county government. Most of these rural young folks between the ages of ten and twenty-one are carrying on some sort of conservation work as a part of their 4-H club program. They are feeding the birds and small animals through the long winters, protecting the forests from fire, planting trees, and carrying other conservation ideas on the family land or in the local community. Some specific improvement to encourage or protect wildlife is made each year on about 24,000 farms by the younger members of the farm family as part of 4-H club work.

In Missouri more than 3000 boys and girls have made maps of their own home farms showing timber, brush, grass and cultivated crops where suitable cover and food for wildlife is found. Several hundred North Carolina young people made a wildlife survey showing among other things the different types and number of wild animals and birds on the farm of each member every month of the year. Calling the roll for the birds and animals on the farm proved to be great fun for these youngsters, and, as the records grew, the parents, the aunts and uncles, cousins and neighbors, also became interested in the numbers and variety of wildlife living around them throughout the year.

The Jenson boys—Glen, Delwin and Lynn—living at Lake Travers, South Dakota, have their own private wild game refuge for migratory waterfowl. As part of their work, they have made a huge scrap book of pictures of wildlife in their vicinity. They are wielding a real influence for the conservation of natural resources in their neighborhood.

A North Dakota 4-H boy, Max Lozensky of Ward County, reported his conservation activities seasonally. He wrote:

"During the spring's work, I found a number of nests in the fields, so I carried the nests over on the worked land. Later in the summer when the lakes went dry, the young ducks came around the farm looking for water so I dug a shallow hole near the well and pumped water in it for the ducks. In the winter, I opened up straw piles for the prairie chickens, pheasants and partridges so they could get at the grain which was in the straw."

Another North Dakota club member, Irvin Carlson of

Stutsman County, made his annual report of conservation activities thus:

"In order to provide shelter and feed for pheasants during the cold winter months, I left two rows of ripe corn standing near a grove of trees last fall, and later noticed that a flock of pheasants took advantage of this food and shelter. To prevent the cat from climbing up the tree and catching the birds and their young, I put tin around the trunk of the tree in which the birds had their nests. I also put flushing bars on the mower used for haying in order to protect the wildlife hidden in the grass from injury."

The establishment of a 12,320 acre wildlife management area was an accomplishment of the eighteen members of the Twilight Community 4-H club in Laclede County, Missouri, in 1939.

The club evidenced an interest in wildlife conservation work early in the year when they obtained 200 pounds of lespedeza seed from the Missouri Conservation Commission. This they seeded along gullies, in little-used fields, and other such places, for the benefit of quail. Later club members ordered black locust seedlings to be set out in eroded spots so that cover would be furnished for game.

NATURE STUDY ON THE RANGE

Members of a Colorado 4-H club get acquainted with the wild flowers that grow in the fields

When the transplanting of seedlings ended, the group decided to attempt the formation of a refuge area to embrace the entire community. They sponsored a series of community meetings at which the general plan was presented. Sentiment appeared to be favorable, so the group began a complete survey of the area. The club members visited each farm and drew in on a map the fields, streams, waste areas, ponds and woodlands.

As the work progressed, it attracted increased interest among the farmers of the community and they gave full cooperation to the survey. Then, when the survey was completed, the farm owners and operators gathered together at the community center and agreed to follow an area management plan. This plan included provisions for restricting game killing, improving natural cover for wildlife, and making available greater amounts of water and feed.

The details of the plan were worked out by the club members with the help of Hensley Hall, county agricultural agent, and Arthur Denny, field biologist of the Conservation Commission. Ten additional ponds have been planned for the area to insure an adequate water supply. The ponds will be one fourth acre or more in size, at least six feet deep, will have spillways, and will be fenced. The banks and edges of the ponds will be planted to aquatic plants such as spike rush and arrowhead plant.

A wildlife area is also the project of the Gibsland 4-H club in Bienville Parish, Louisiana. The twenty-five members of the club obtained the cooperation of their parents and neighbors in establishing a farm wildlife area of 5825 acres. Groups of farms were organized into wildlife management units of 160 acres to 1200 acres in size with one or more club members in charge of each unit. Working together in all their spare time they made and posted signs against hunting around the farms in the reserved area; they inventoried the seed stock and checked the amount of all kinds of food and shelter for wildlife that the farms afforded. They found 625 pairs of quail already on the land. Where farms had been overhunted, they raised quail to replace them. The eggs were supplied by a conservation association in a nearby city and the young people were successful in hatching them with Bantam hens on the farms of the 4-H poultry club members.

Oklahoma boys more than 1400 strong have undertaken a big job in conservation by fencing off thousands of acres of rough and gullied land with barbed wire for all year-round protection from grazing. The plots vary in size from one to seven acres and are on some of the worst gullied and eroded land in the state, and no longer suitable for raising crops. These plots are guarded against fire, and visited at least once each month to check on the growth of vegetation and the wild animal population. A count of birds and animals is made on each visit. Specimens of all plants are collected for study in determining the increase in different types of vegetation each year.

Minnesota has long been a leader in the 4-H conservation work. The State extension forester reports that more than 35,000 farm boys and girls have made contributions to restoration and protection of forests, game, fish and useful birds in both water and land projects. He asserts, with perhaps pardonable pride, that the contribution of these young people has more than doubled the efforts of wildlife organizations in the State during the past ten years. In Minnesota, 1300 clubs maintain conservation libraries containing State and Federal bulletins, pamphlets, circulars and books about birds, trees, plants and mammals.

In Ramsey County, Minnesota, the county federation of 31 different 4-H clubs has also established a conservation reserve—an island in Goose Lake. Everything on this island is in its natural state. The underbrush is heavy and there are many varieties of trees and shrubs and flowers. The boys and girls soon identified twenty-one kinds of

A RARE PLANT IS FOUND ON THE TRAIL

Members of a 4-H club in Norfolk County, Massachusetts, make a discovery. Construction of Nature trails is one of many activities of the groups

wild flowers, fourteen trees, fifteen water-birds, thirty-two song birds and, of course, squirrels, rabbits and woodchucks, which are native on the island. Trails on the island have been made so visitors will not trample flowers and shrubs and the club members have made and put up signs asking that berries and flowers be left unpicked. In the winter the boys and girls visit the island regularly carrying feed for the pheasants, to provide a safe feeding place for animals, and especially to draw the pheasants off the highway. In addition to working on their reserve, the members, numbering almost 250, make Nature scrap books, build bird houses, collect leaves, flowers and seeds, and also are pledged to make at least one talk on conservation each year, either in their own club or in some other organization.

Feeding wild mammals and birds during the long cold winter season is done by thousands of 4-H club members. The grain and feed are sometimes bought by the club, sometimes by local sportsmen's organizations, Audubon clubs, Izaak Walton Leagues or Nature clubs, and are distributed by the 4-H boys and girls on their own home farms or in their own neighborhood. Often the parents supplement the supply of grain distributed by the young son or daughter. In Lassen County, California, 1800 pounds of grain were fed to quail, pheasants and ducks during a cold, snowy season. Each boy and girl in the 4-H club kept a record of the game birds fed and altogether they reported 2000 quail, 650 pheasants and 200 ducks fed.

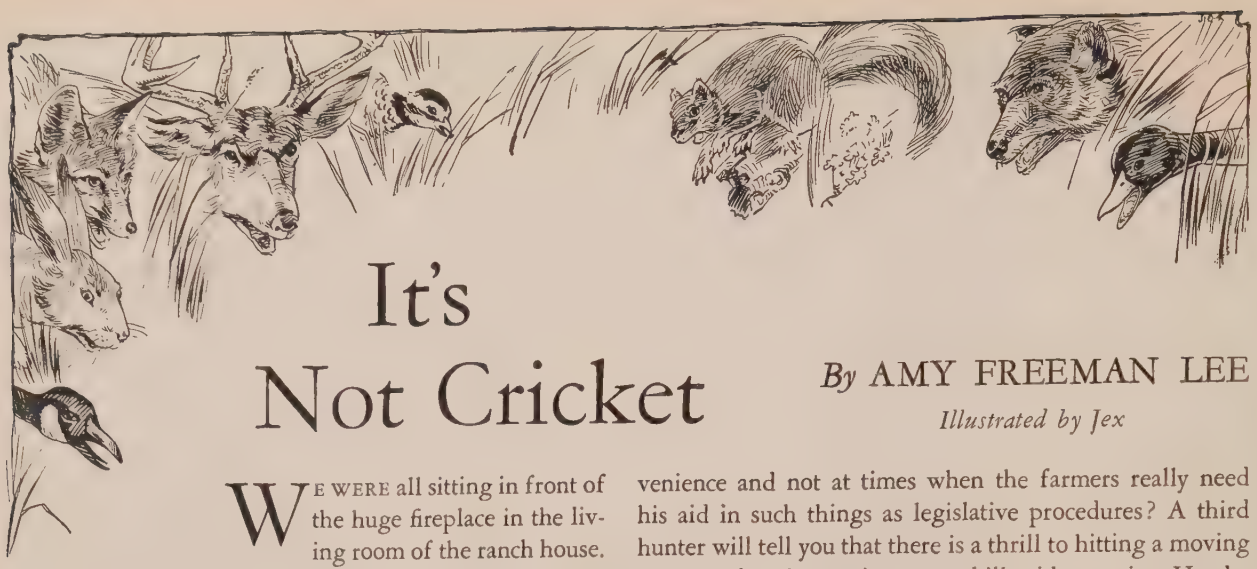
One of the principal limitations to further development of 4-H conservation activities is the lack of trained and qualified leaders willing to direct the work of a local group of young people. When leaders such as Miss Nuterich, a school teacher who leads the Southwest Birds Nature Club in Middlesex County, Connecticut, can be found, conservation and love for the feathered songsters on the farms naturally increase. This club holds weekly meetings to study birds, and has made a large chart recording the first time and place birds were seen and the person reporting the event. On their frequent field trips they saw and identified more than fifty different species of birds. When the county fair came along, they prepared an exhibit to show the older folks in the county what they were missing if they did not know their own neighborhood birds.

School teachers often prove good leaders in Nature study. In an isolated mountain community in Judith Basin County, Montana, the teacher has organized a 4-H wildlife study club that has studied thirty bird species and completed all the work laid out for them 100 percent.

Some of the activities of Nature study clubs are check lists of birds, animals, trees and flowers; collections of leaves, flowers, woods, rocks and insects; identification contests for plants and animals and insects; Nature walks, and wildlife exhibits at the county and state fairs. These activities not only teach the young folks about the plants and animals around them but interest the families and neighbors in conservation of their wildlife heritage.

The need for more and better trained leaders for Nature clubs is being partially met by training the older boys and girls for leadership. The State Conservation camps held each year in the late summer or early fall in practically every state are helping to solve this problem. The privilege of attending camp is awarded to those older 4-H club members who have done the best conservation work and have also shown ability in leading their own group.

The conservation camp is held in some spot of natural beauty, sometimes at the permanent State 4-H club camp now available in a number of states. Here an intensive study of the plants, trees, animals and other wildlife is facilitated. The young naturalists meet noted scientists; hear and work with experienced naturalists and leaders in the conservation movement in their state. They also usually visit one of the wildlife or bird refuges or take a trip to a State or National forest and hear how these are managed. Between sixty and one hundred rural young people with a background of Nature study and conservation work attend these camps annually in each state, spending a week intensively studying conservation.



It's Not Cricket

By AMY FREEMAN LEE

Illustrated by Jex

WE WERE all sitting in front of the huge fireplace in the living room of the ranch house. It was pleasant just to listen to the crackling of the logs and to smell their cedar odor, for we were tired and chilled from a pleasant but long horseback ride. There was a general lack of conversation. One could almost hear the silence, when two of the boys began a casual account of a recent deer hunting expedition. Although I did not enjoy hunting, or approve of it, I had trained myself to refrain from voicing my objections. It always led to violent arguments and never actually accomplished anything. I was managing to restrain myself very well, listening to my friends repeatedly state what great *sport* it was to hunt deer. The constant repetition of the word sport wore down my inhibitions.

I entered into the conversation by admitting frankly that I had never enjoyed hunting, but that it was not this subjective dislike that had caused me to formulate my conclusions regarding it. For example, I have always found golf to be a frightfully dull sport, yet it is obvious to me how it could be fascinating to other people, and at least it's good exercise, and, therefore, beneficial. I have always been particularly fond of horseback riding, but I have never been so dogmatic as to insist that it should be the most enjoyable activity for anyone else. Neither have I been guilty of a purely sentimental approach to hunting. That is, I have never shed tears over the fact that some buck that was shot was some fawn's father, or that some dove that was killed was the mother of starving fledglings. This is the typical reaction of the sentimentalist. I do not suffer under any romantic delusions, for I am well aware of the fact that throughout history stronger or cleverer animals have devoured weaker or duller ones, forming the basis for the survival of the fittest and a law of Nature.

I have talked to hunters of all types who kill everything from doves to lions. I am also familiar with all of their stock answers as to why they enjoy hunting. One will say he enjoys hunting because it gets him back to Nature where he can live simply and relax. My suggestion to him is to try a hike in the woods or a cabin in the pines. Another hunter will tell you that if we did not shoot the wild game, they would multiply so rapidly they would devour the crops. Why is it that a man suddenly becomes so interested in the farmer's problems when it suits his personal convenience and not at times when the farmers really need his aid in such things as legislative procedures? A third hunter will tell you that there is a thrill to hitting a moving target and to improving your skill with practice. Has he ever heard of shooting galleries and skeet shooting that offer these opportunities? Still another will try to answer you negatively by saying, "You eat lamb chops and chicken, so what's the difference?" These are really not answers, but weak attempts to find some justifiable excuse, reason or compensation for this desire to kill. I challenge and defy any hunter to justify his activity, for I have never yet found one who could, and yet I am more than willing to listen.

What then is my objection to hunting other than my personal, subjective dislike for it? First, I object to it because it is not justified as an activity of man as a human being, whether industrial, governmental or fraternal. Perhaps it does have a place in man's activities as a bestial being, but man of this type is supposed no longer to have a place in civilization or culture. He was only a phase in physical anthropology.

Second, the unnecessary destruction of animals that add to the beauty of Nature—even the destruction of those animals that are not comely or graceful—seems to me brutal, savage and cruel. Perhaps it is mental limitation on my part, but the process of firing a gun, sending bullets that tear the skin, make the blood flow and so drain the life out of some animal just does not come under the heading of fun or sport. Can this be so far beyond my comprehension, because I suffer from fear of death myself and thus hesitate to take the life from another creature, or is it because I am an esthete to whom human beings in soiled, bloodstained, powder-burned clothes

(Cont'd on p. 472)

MARTY DZIB

What Nature means to one Maya Indian

By MORRIS STEGGERDA

THE HERO OF THIS STORY
Marty Dzib of Piste, Yucatan, whose wide knowledge of Nature is detailed in this article

ABOUT two miles from the center of the ruins of Chichen Itza, Mexico, there is a small Indian village called Piste. This Yucatan town of 400 inhabitants contains the ruins of many Maya temples, evidence that the suburbs of ancient Chichen Itza extended for several miles. Piste (pronounced Pees-tay) differs little from other Yucatan towns except that its contemporary population is predominantly Indian rather than mestizo, or mixed-blood.

More than 85 percent of the diet of the Maya Indian is corn, so the chief occupation of the men of the town is raising corn. Every man has his own milpa, or corn field, and in it he tends his plants and harvests the crops in a manner very different from any method of corn-farming known in the United States. The forest or bush is first cut, then allowed to dry for several months, and finally is burned. In the resulting ashes and shallow, rocky soil the seed is planted in May at the beginning of the rainy season. No plowing, cultivating or hoeing can be done; weeds are kept in check by periodic cutting with a machete. Sun, clouds, rain, insects, birds and mammals all become part of the Maya's very existence because the success of the milpa depends largely upon them. Each tree, each kind of weed and grass, seems to be used for some definite purpose. There being no organized medicine among the Maya, many plants are used for medicinal purposes. In this environment the Maya children are raised, and, like the little Hiawatha, learn "of every bird its language, learn their names and all their secrets."

Martiniano Dzib and his young wife, Fernanda Tec, were two such children. They grew up together in Piste. During the first nine years of their married life Martiniano (called Marty by the Americans) has been the author's assistant and interpreter. During this time his mind has proved a well of information. Its depth is still unfathomed, and it continues to produce new data, perhaps even more freely now than during the first years.

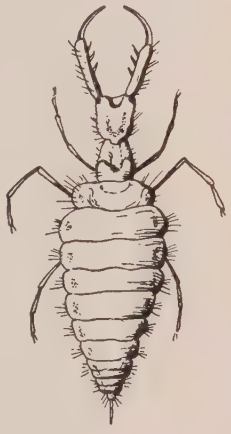
My purpose here is to indicate the familiarity with Nature of this unschooled Indian. It would be impossible to recall all that Marty has revealed of his knowledge of Nature. We must be content with some instances to show the sort of things he knows, and how closely superstition is interwoven with factual knowledge.

In working over a list of plants and animals that Marty described, I find that he mentioned 208 animals and 233 plants. For each he had some story to tell regarding either the mythical origin of its

TYPICAL YUCATAN BUSH HOUSE OF THE MAYA
The materials and furnishings of this dwelling demonstrate the Indians' reliance upon Nature's resources

name, its use, or its distinguishing characteristics. The list becomes more remarkable when one remembers that it was compiled in about two days' time and that every form listed is native to the state of Yucatan, an area not larger than that occupied by Vermont and New Hampshire. If we were asked to name all the animals we knew, we might begin the list with: lion, tiger, or elephant, animals from Africa or Asia, which Marty may have known indirectly, but did not list. Or we might begin with horse, cow, or pig. Again, he left out all domestic animals. He apparently omitted those that had neither a practical nor a legendary significance in his daily life, for he did not mention aquatic forms that are abundant in the water holes, or turtles and snails, animals with which I am sure he was well acquainted. Marty mentioned thirty-four local mammals, including varieties of bats, rats, weasels and squirrels, larger mammals like the fox, skunk, raccoon, peccary and deer, and five typical only of the Yucatan bush.

Instead of discussing each of the forms let us go with Marty into his home, visit some of his friends and go with him into the bush. As we walk with him, we learn that the Maya believe in many animals that they cannot see. The *kulu-chaac*, for example, is the rain-god's dog, thought to cause damage in corn fields. No Maya person has ever seen one, but all describe it as having no hair. These mythical dogs are harmful to the corn, and to rid a milpa of them, the milpero merely announces aloud: "*Kulu*, if you come tonight, I shall roast you tomorrow." If the *kulu* hears this threat, he will not enter the milpa again. Marty told the story of the *kulu-chaac* but would not vouch for its truth. He claimed, however, that he and all Maya believe that there is a deer in the Yucatan bush in whose branched horns there is a wasp's nest, and if a man should kill this deer he would himself die suddenly.



Ant lions are boiled, and powdered to make medicine for youthful Mayas with a cough. The pic bug, below, is a source of infection.

Coming to the home of Marty's mother-in-law, we let our friend go first to make the arrangements. With the tip of his index finger he softly knocks three or four times on the door. No answer, and it seems that no answer is expected. Again three or four quiet knocks and a greeting of "*Buenos dias.*" Still no answer. After another short wait the door opens, benches are brought for all, and a home-made hammock is lowered for the honored guests.

Inside this one-room, rectangular house, which has two doors but no windows, a thatched roof and a dirt floor, there are countless objects taken directly from the bush: gourds for dishes, benches of logs, three stones for a hearth, and vines to support and tie things in their places. Dogs, pigs, chickens, ducks and even cows wander in through the open doors of the house. Rats abound in the thatch; ants and spiders are everywhere. Lice, ticks and bed bugs are common in the hammocks. The dogs—one family had eighteen—all have lice, ticks and intestinal parasites. The same is true for the cattle, deer and pigs. If one sits quietly, the rats in the thatch leave their hiding places and descend to the floor among the kettles of boiled corn. When we remark upon the large number of rats, Marty demonstrates a Maya method of catching them. He quickly climbs among the roof poles, and, with a long, sharp stick, he spears and then drops a squirming animal to the floor, where it is killed. There are, it appears, two kinds of local rats, one the common brown rat and another the black rat, which, he claims, can change itself into a bat. Bats, we are told, are caught with the thorns of the *beeb* tree, *Pisonia*. The sharp, spiny branches are placed over an open chicken house and as the bats fly into the coop they become ensnared in the thorns. Marty believes that it is bad luck to have a bat or certain birds, especially a crow, fly through the house. Black moths are also an omen of bad luck, but large butterflies flying about the room are not driven out, for they are believed to be the souls of dead relatives. The baby chicks, which pass in and out of the house, each have a bright-colored thread sewed into the skin of the head. This precaution, according to our authority, will keep away the evil spirits. Around the baby's wrist is a string with several tympanic bones of the *tzub*, or agouti. These bones are supposed to act as a charm for the baby and bring only good luck.

Around the walls of this room one notices several hens patiently brooding amid the noise and activity of the household. The setting of these hens is surrounded with an abundance of folk-lore. Marty says, for example, that it would be unwise to drink *balche*, a fermented native drink made from a tree by the same name, *Lonchocarpus*, or to eat the tuber called macal, *Dioscorea*, if one wishes to set hens. If one does either, the eggs will not hatch. If, on the other hand, the family forces the hen to eat *macal* with them, then all will be well. The flowers of a plant called *siempre-vive* are believed to leave an invisible stain on the hands, causing owners of setting hens to have bad luck with the hatches.

Around the house are various items of interest; for example, the home-made brooms. Marty tells that one is made from the branches of the *zac xiu*, *Abutilon*, because its leaves do not fall off easily. Another broom is made from the *ic-aban*, *Croton*, which is so strongly aromatic that when used it rids the house of fleas. We wonder about the gourd dishes, and learn the names of the gourds, how they grow, where to look for them, and how they are finally made into dishes, dippers, and water bottles.

We notice branches and pieces of bark stuck casually between the side poles of the house. These are medicines;

A gourd holder is a necessary piece of adornment in the Maya household. The gourds serve various purposes.

certain ones for sores, others for laxatives and various ailments. The castor plant grows outside nearly every home, and its seeds are roasted and ground to a fine powder. This is boiled and the oil that gathers on the surface is skimmed off and used as a purgative.

The day is passing, and Marty has promised to take us for a walk along a bush trail to show us the living things outside the house. So we bid adieu to his mother-in-law, Feliciana. As we leave, we remark that her eyes were red, as if she had been weeping. We are told that she wept because she feared that soon a calamity would befall her family. She had seen her bees fighting. Later we learn that within three days her son-in-law, Santiago, died a violent death in the bush. Such will live long in memory.

In the yard behind the house we pass the domestic animals—a horse, several cows, pigs, chickens, turkeys and ducks. Among them we notice a deer, a large rodent called *tepescuintle,* the paca, and a wild pig or peccary, all of which are kept as pets. Other pets of the Maya are parrots, wild doves, and a gallinaceous bird called a chachalaca. Dogs are never treated as pets, but are used solely for hunting.

On our tour of Maya surroundings we come upon an agave plant with many egg shells hung on its spines. These shells are made into face powder. First they are soaked in water containing wood ashes, then washed with laundry soap, and thoroughly ground, and finally the wet powder, to which may be added extracts from flowers, is dropped into molds or little patties. Often such a cake of egg shell powder is rubbed on the body before a bath, thus acting as a cleanser.

Another feminine favorite is the seed pod of the *zizbic,* or vanilla orchid, which the Maya women tie about their necks inside their clothes as perfume. The odor is delicate and pleasing. Marty tells also of a soap and shampoo his wife makes from the leaves and roots of *zabila, Aloe vera* and of the melted chicken fat she uses as a hair tonic in case of dandruff. The tree that produces *copal* is burned as an incense.

Marty's mother can cure many ills with native plants, including canker sores, insect bites, blisters, headache, stomach trouble, halitosis, loss of appetite, vomiting, fevers, skin diseases, digestive disturbances, respiratory trouble, reproductive disorders. She can alleviate earache, toothache and asthma, but does not attempt surgery.

"What does she do for loss of appetite, Marty?" we ask. We pass on the prescription: Boil nine sour orange leaves, add a little honey, *oregano* (seasoning), and salt, and give this to the patient to drink. Sometimes the roots of the *x-cambalhau, Dorstenia,* are toasted and ground to powder and then added to the regular food of the patient. Marty adds still a third remedy: Grind the leaves of the *yerbabuena* and mix with ground boiled corn. This is made into a flat corn cake and, while still hot, is placed in a cloth and applied to the stomach. The patient must stay indoors for a short period after this treatment, and should not get too cool or have cold winds blow upon him.

Going farther into the bush, the foot path is bounded on each side by dry, tangled, thorny trees and vines. Marty patiently satisfies our curiosity concerning many interesting objects. "What animal makes that rustling sound in the leaves along the trail?" we inquire, and learn that it is the *zil-uoh,* a small gray lizard. Another lizard, called the *x-tulub* lives entirely on flies and ants, and has a peculiar swelling under its throat that becomes especially prominent during the mating season. Then, too, there is the iguana, which, Marty tells us, lays as many as thirty or forty eggs among the rocks. One little lizard, called the *toloc,* has the habit of running on its hind legs as did some of the ancient dinosaurs. This small Yucatan lizard has a definite comb-like structure on its head and the Maya use this animal as a weather prophet. When the *toloc* runs on its hind legs, it is a sign of dry, hot weather and the time has come to burn the milpas.

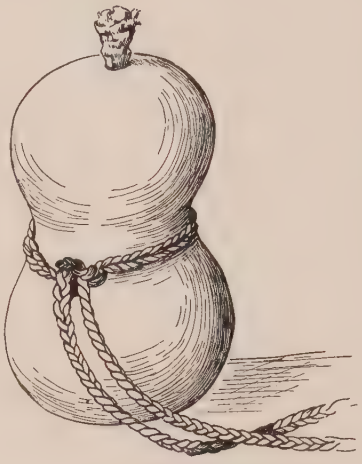
Suddenly Marty raises his finger and asks us to listen to the chirping of a cicada, called *koch.* If the chirping is long and continuous, it is a sure sign of rain; while the call of another variety of the *koch* is a sign of dry weather. By varying their chirping, these insects predict rain at irregular intervals. Birds likewise are definitely influenced by the weather. The *bech-haa,* or quail, so enjoys the rain that it sings constantly during a downpour, while a bird called the *dzucuy* always cries when it rains and many die because, Marty tells us, this bird has no oil gland near its tail.

Maya water bucket of bark strengthened with ropes made from wild vines.

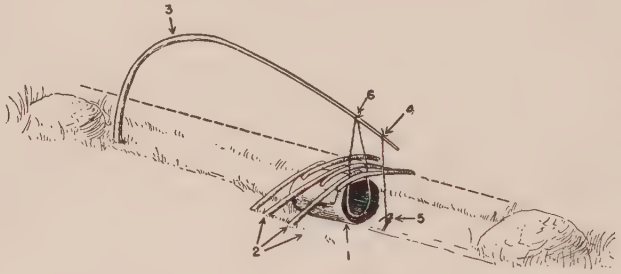
In our walk through the bush, Marty is observant of all things. At one point he selects a small branch and sweeps the path in front of him. There are many *garrapatas,* or wood ticks, here and he is brushing them off the path. To prove his point, he picks a small twig that at first appears to hold a bud or small seed pod, which turns out to be a cluster of tiny *garrapatas.* Later, in the laboratory, we counted more than 3000 ticks on this one-inch twig. Innocent looking little creatures, these *garrapatas,* but they grow

beneath the human skin, and cause severe irritation. However, the Maya do not allow them to remain on the body long enough for them to burrow far, for they are a clean people and take baths daily. Either the ticks are picked off individually by the careful fingers of the wife or mother, or the individual uses a flexible piece of beeswax kneaded like putty. When applied to the skin infected with ticks, this completely absorbs the parasites.

All along the trail Marty gives the names of the various plants and explains how they are used. This *chacte* tree provides the corner posts of Maya houses; the *yax-xul* the roof poles, the vine *xanicab* ties the poles together; the leaves of the *xaan,* a palm, thatch the roof. The wood of the *xkikche* and the *tzalam* are specially good for firewood, but care must be taken not to include that of the *uaxim, Leucaena,* because Maya women use wood ashes from the hearth for washing clothes, and *uaxim* ashes are very caustic and cause sore hands. The Maya believe that if horses eat the leaves of this tree, the hair of their tails will fall out. Marty proves this assertion by citing various Piste horses that have eaten the leaves, and every one has a stubby tail.



A gourd cleverly and effectively adapted for the purpose of carrying water.



Trap placed under ground in the path of burrowing rodents. Broken line indicates the surface of the ground.

Of the 233 plants on Marty's list nearly every one serves some specific use. Some are used for building; some for making furniture; others for making toys, torches, sky rockets, ox-carts, axe handles and animal traps. Our young Maya tells of the trap for burrowing rodents, and describes special traps for the deer, jaguar and certain birds, and a stone trap for the paca, a food animal.

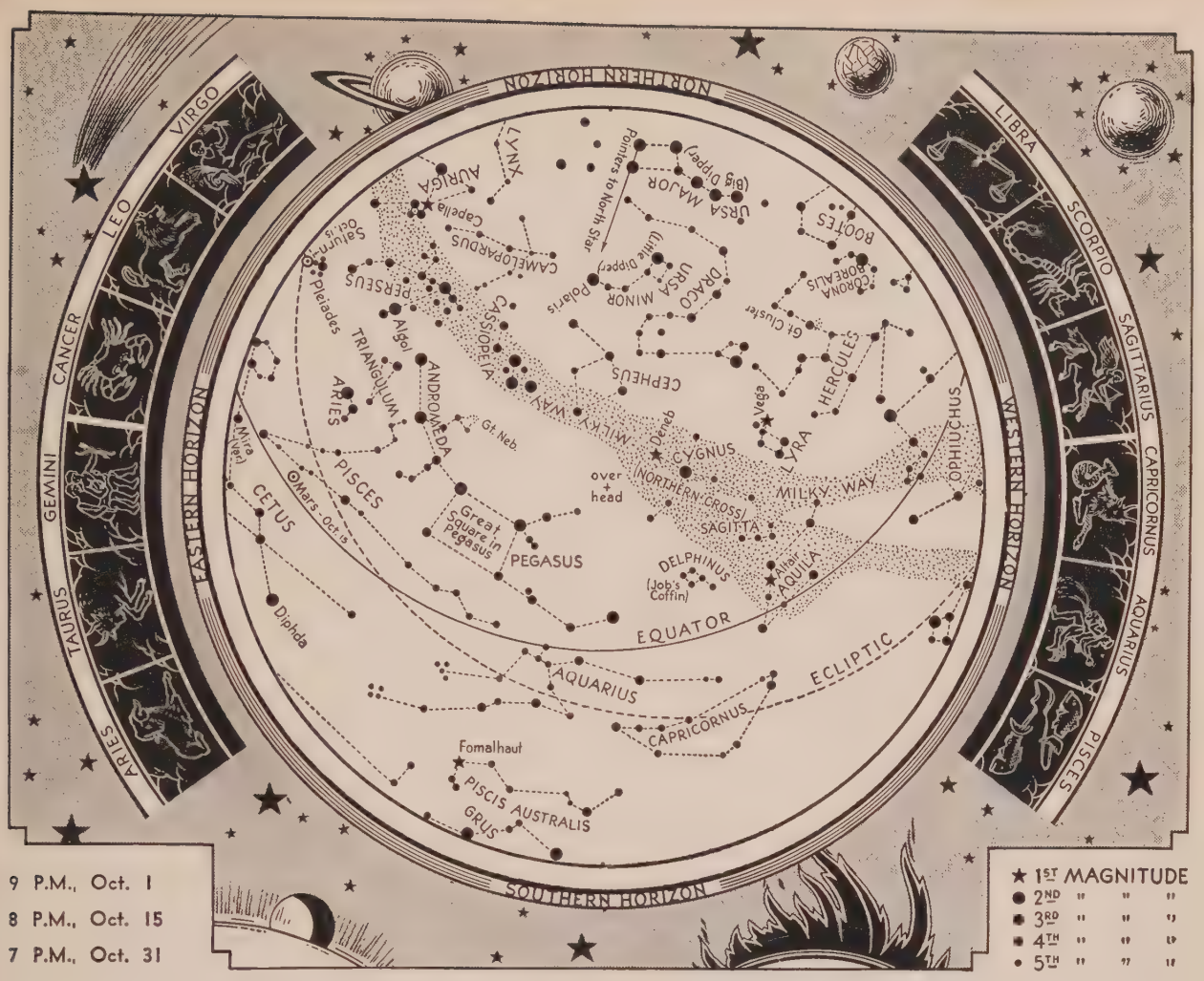
Marty can spend hours telling of birds and their habits, imitating their calls, describing their markings, their nesting habits, when and where they lay their eggs, the color of the eggs, and how many are laid. He refers to a bird called *x-ppilan-keuel,* which is medium in size but has large patches of white feathers and red eye-lids. The *x-ppocin,* he says, has four white stripes on its head and has yellow wing coverts. He describes the habits of a bird, *dzu,* that never builds its own nest but lays its eggs in the nests of other birds, and is said to have the peculiar habit of mating on the wing. The *toh* bird has a space of two or three inches where only the shafts of the two long tail feathers remain, all the barbs being absent. It appears that the *toh,* seeing a goodly number of people passing down the road, said to himself, "I am sleepy, I will rest awhile." As he lay sleeping other birds walked over his tail. When he awoke he found that the barbs of his tail feathers were gone. The *cuxtin* is "a very lazy bird." One can walk right up to it and it will not fly away. Another bird is called *xnuc,* a small owl with a peculiar call. It will hoot as many as eighty or ninety times in succession. Sometimes the brains of the humming birds are roasted and ground into powder for use as a love potion.

Marty's knowledge is not confined to the birds and larger animals, and while he seems to know much about the larger animals, he is a specialist when it comes to the arthropods. Fourteen varieties of ants, twelve varieties of bees and almost an equal number of wasps are known to him intimately. What country lad can name so many different ants and bees and wasps, or, for that matter, what general zoologist?

"Show us the different kinds of ants you know, Marty," we suggest. That seems easy, for he stops at a spiny shrub called *zubin* in Maya. Each branch has a series of thorns shaped much like the horns of a bull, so much so that the Spaniards named the tree, *cornezuelo,* a word describing such horns. Each pair of thorns has one tiny hole at the tip of one thorn and inside the hollow thorns live a small colony of red ants. These, according to Marty, have a terrible bite. Our ant study is interrupted by a particular wasp that always builds its paper-like nest in the *zubin* tree. Then Marty shows us a palm tree, and tells of a small red ant called *uex* which makes its home only in this tree. This ant bites but does not sting. "That is interesting. Are there any ants that sting?" The *hochleum,* or tiger ant, is large and black, and both bites and stings, he tells us. Later we acquired first-hand knowledge and can testify that no bee or wasp produces such pain.

As we walk along we cross a path of the *zay* or umbrella ant. This is the ant that carries small fragments of leaves to its underground nest and lives on the fungus that grows on these leaf fragments. (See NATURE MAGAZINE, March, 1941, page 129.) Then there is *xulab,* the army ant, which always travels when it is about to rain. Another ant, *zinic,* lives on decaying animal matter; and the *simechex* lives only in trees. There are many more ants, says Marty, including the *xkulzinic,* which are small but have a severe bite. After a funeral, some Maya plunge their hands into a colony of these ants, and after being severely bitten, feel that their hands are thoroughly disinfected. There are the *chac-uya-cab* ants, which feed on bees, sometimes coming in such numbers that the bees leave their hives. The tiny ants called *dzidzil* cause food to smell badly when they get into it.

Marty turns to bees, starting (Continued on page 469)



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

Mars Nears the Earth

By ISABEL M. LEWIS

MARS will be closer to the earth this month than it will be for fifteen more years to come. Its nearest approach to our planet will be on October 3, when it will be at a distance of 38,130,000 miles. It will be in opposition to the sun and on the meridian at midnight on October 10, and will then be visible throughout the night. Its brilliant reddish rays will attract universal attention, and temporarily it will outshine even the mighty Jupiter, which appears a deep yellow in color.

Favorable oppositions of Mars occur every fifteen or seventeen years, always in the months of July, August, September, or early in October. Then the earth is in the part of its orbit farthest from the sun, and Mars, in line with it at the time, in the part of its orbit nearest the sun. The two planets are then much closer together than they are when the earth is nearest the sun and Mars farthest from the sun at the time they are in line. In the first instance the opposition of Mars is said to be favorable, in the second, unfavorable. The most unfavorable oppositions occur in the months of January or February. There can be a difference of as much as thirty million miles between the distance of Mars from the earth at a favorable opposition and at an unfavorable opposition. The most favorable opposition of Mars in two centuries occurred on August 23, 1924, when the planet was at a distance of 34,550,000 miles. This is probably within a few thousand miles of being the closest possible approach of the two planets. At the opposition of July, 1939, Mars was two million miles closer to the earth than it will be this October. The planet was very far south then and not well placed for observation in this hemisphere, although in fine position for observation in the southern hemisphere. Oppositions of Mars occur every other year and at the next opposition in December, 1943, the planet will be 50,110,000 miles away. At the next favorable opposition in September, 1956, Mars will be 35,100,000 miles from us.

It was in the month of August, 1877, that Asaph Hall, Senior, discovered the two small satellites of Mars with the then new 26-inch refractor of the U. S. Naval Observatory, at that time the largest in the world. Hall had begun the search early in August, a month before opposition, which was to come on September 5. This was to be a favorable opposition. The planet would be nearest the earth on September 2, at a distance of 34,990,000 miles. The prospects of discovering any moons of Mars seemed rather discouraging. Sir William Herschel had made a special search for satellites in 1783 and his failure to find any had evidently convinced astronomers that Mars had no moons. Hall wrote later that had it not been for the encouragement of his wife he might have abandoned the search. As in 1939 the planet was then some distance south of the equator, hampering an observer so far north.

The search for satellites was made at first some distance from the planet. All faint objects observed turned out to be faint stars. On August 10 he began to search closer to the planet, in the glare of light surrounding it. The blazing ball of the planet was kept out of the field of view and the eye-piece was turned continually so as to pass completely around the planet. Nothing was found that night. On the following night, however, after he had repeated the sweep around the planet several times, Hall found a faint object, following and a little north of the planet. This object proved later to be the outer and fainter of the two satellites. Fog from the Potomac stopped the work and a few cloudy nights followed. The planet was at that time about 38,000,000 miles from the earth. On August 16 the object was found again. On the following night, while watching for the first object, Hall discovered the inner and brighter satellite. Observations made on the next two nights proved that the two objects were revolving around the planet and were satellites of Mars.

The two tiny moons were named Phobos and Deimos by their discoverer. These were the names of the horses that drew the chariot of Mars but were personified by Homer as the attendants or sons of Mars, namely Fear and Flight. The brighter satellite, Phobos, is about 5800 miles distant from the center of Mars. It is of the 12th magnitude and only ten miles or so in diameter. The odd fact about this satellite is that it makes three complete revolutions around Mars in less time than it takes the planet to turn on its axis. As a result it rises in the west, backs across the sky and sets in the east, contrary to the behavior of all other satellites. It also has the shortest period of any known satellite—7 hours 39 minutes. Deimos, the outer satellite, is a magnitude fainter than the inner satellite, is about five miles in diameter, and 14,600 miles from the center of the planet. It makes one revolution around Mars in one day, six hours and eighteen minutes. The rotation period of Mars is 24 hours 37 minutes 22.6 seconds, very little different from that of the earth.

The inclination of Mars' equator to its orbit differs little from the inclination of the earth's equator to its orbit. As a result the seasons on Mars, insofar as they depend on that circumstance, should be similar to our own, although they are about twice as long, since the planet's year is about twice that of our own planet.

The surface features of Mars have been more closely scrutinized than those of any other planet, although they can be observed to advantage only for the period of two or three months preceding and following the times of more favorable oppositions of Mars. The reddish ochre color of much of its surface, probably large desert tracts arising from scarcity of water, give the planet its ruddy color. Observations at Mount Wilson indicate that the amount of water vapor in the Martian atmosphere cannot exceed five per cent of the amount in the earth's atmosphere. It has been estimated that the surface air temperature at the equator of Mars at midday does not exceed that of a clear, cool day in spring on the earth. The atmosphere of the planet is very rare, which accounts for the fact that so many of its surface markings are visible. From photographs of the planet taken in infra-red and ultra-violet light it has been estimated that the atmosphere of Mars is about 100 miles in height.

The extremes of temperature between day and night are very great. In addition to the polar caps, which show marked seasonal changes, many transient white spots are visible on the planet's surface, undoubtedly due to clouds or hoar frost. There are also many dark markings, permanent in character, such as the Syrtis Major, which is the most conspicuous marking on the planet's surface. These features are generally bluish-gray, or greenish.

A most interesting observation was made at the last two oppositions of Mars. The dark northern tip of the Syrtis Major was noted to be of a deep blue color at times. On one occasion this color was seen to develop in a period of four days and persist for about three days. During the present apparition of Mars the southern hemisphere of the planet will be tipped toward the earth and its markings will be the ones most favorably placed for observation. It will be mid-summer or early fall in the southern hemisphere of the planet and the south polar cap should dwindle to a small area during that period.

There is no doubt of the existence of dark streaks of varying length and visibility on the Martian surface—known universally by the names of canals—that show marked changes with the seasons and the melting of the polarcaps. These are always objects of much observation and discussion at each and every favorable opposition. Many observations of the planet's surface markings will undoubtedly be obtained during the present opposition, as this will be the best opportunity for some years.

The planets Venus, Jupiter, and Saturn are all well placed for observation in the evening at this time, although Jupiter will not rise until about three hours after sunset. It will remain nearly stationary between the horns of Taurus during the month. Less brilliant than Mars the first of the month, it will outshine it later in the month.

Venus is now a brilliant object in the evening twilight. It will set about two hours after the sun.

Saturn is now as brilliant as Vega and a pale yellow in color. It is in Taurus, west of Jupiter and south of the Pleiades, and rises less than two hours after sunset.

Mercury is poorly placed for observation this month.

State Bird Check Up

Some years ago the American Nature Association brought out the booklet entitled *Birds of the States,* with its colored pictures of State Birds. It was published to aid in bird study, and to stimulate further interest in the selection of official bird emblems to the end that every state would have an official bird just as every state now has an official flower emblem.

Periodically the American Nature Association has checked up on progress to this end and is happy to report the situation as of July, 1941. Following are the *official* state birds together with the date of recognition:

Alabama, Flicker, 1927; Arizona, Cactus Wren, 1931; Arkansas, Mockingbird, 1929; California, California Quail, 1931; Colorado, Lark Bunting, 1931; Delaware, Blue Hen's Chickens, 1939; District of Columbia, Woodthrush, 1927; Florida, Mockingbird, 1927; Georgia, Brown Thrasher, 1931; Idaho, Mountain Bluebird, 1931; Illinois, Cardinal, 1929; Indiana, Cardinal, 1933; Iowa, American Goldfinch, 1933; Kansas, Western Meadowlark, 1937; Kentucky, Cardinal, 1926; Louisiana, Brown Pelican, 1902; Maine, Chickadee, 1927; Maryland, Baltimore Oriole, By Long Custom; Massachusetts, Chickadee, 1941; Michigan, Robin, 1931; Missouri, Bluebird, 1927; Montana, Western Meadowlark, 1931; Nebraska, Western Meadowlark, 1929; New Jersey, Eastern Goldfinch, 1935; Ohio, Cardinal, 1933; Oregon, Western Meadowlark, 1927; Pennsylvania, Ruffed Grouse, 1931; Tennessee, Mockingbird, 1933; Texas, Western Mockingbird, 1927; Utah, Sea Gull, 1913; Vermont, Hermit Thrush, 1941; Virginia, Robin, 1912; Wyoming, Western Meadowlark, 1927.

Thus thirty-two States and the District of Columbia have official bird emblems. A round-up of the others reveals certain interesting facts. The Connecticut Legislature some years ago considered a bill recognizing the Rose-breasted Grosbeak, but the measure was allowed to lapse and has never been revived. In Minnesota the Goldfinch is generally regarded as the state bird but no official action has been taken. In Mississippi the State Federation of Women's Clubs, in 1929, chose the Mockingbird, but this has never been officially confirmed.

The Mountain Bluebird is a candidate for official emblem honors in Nevada, with the support of the State Department of Education and the Federation of Women's Clubs, but legislative action is still to come. Popular vote favors the Purple Finch in New Hampshire, but it has not been given official blessing.

New Mexico with the Roadrunner; New York with the Bluebird; North Carolina with the Carolina Chickadee, and North Dakota with the Western Meadowlark, have unofficial bird emblems. The Carolina Chickadee nearly gained approval in North Carolina, where it was officially designated by the Legislature on May 8, 1933, but the action was repealed seven days later.

In Oklahoma, Bobwhite has popular approval but no official standing, and Rhode Island's legislators have consistently ignored the public choice of the same bird. Neither South Carolina nor South Dakota have recognized the Carolina Wren and the Western Meadowlark, respectively, although these birds have been given popular support.

In Washington a school vote favored the Willow Goldfinch, but as yet it has no friends in the Legislature powerful enough to bring it honor. The Tufted Titmouse nearly gained fame in West Virginia this year, when a resolution recognizing it as the official emblem passed the Senate, was amended in the House, and died in Senate Committee while the amendments were under consideration. In Wisconsin the Robin is the popular but not yet official choice.

Although the fate of nations may not hang upon it, choice of official state birds by every state would focus attention upon the importance of our bird life. It is to be hoped that legislatures in the hesitant states will be urged to act soon.

Tree Guide

A Guide to the Trees. By Carlton C. Curtis. New York. Greenberg. 1941. 208 pages. Drawings and index. $1.50.

This is a new edition and eighth printing of this popular, pocket-size tree guide that has proved its worth since the first printing in 1925. It covers the trees of the United States and Canada from Saskatchewan, the Dakotas and Nebraska east, and from northern Kansas, Missouri, Kentucky and West Virginia north.

Nature Material Needed

Now and again in notes in these pages we have stressed the need of isolated schools for material for teaching helps, and our readers have responded. Now we call to their attention a very definite need for Nature Study material from the field in the schools of New York City. The average boy and girl in the big city has little opportunity to learn about the wonders of Nature, and they have woefully too little material in this field. To meet this situation the New York chapter of the American Nature Study Society, which is made up of principals, teachers and Nature curators, is asking for contributions.

It is suggested that children could collect shells, coral, dried marine life, stones, rocks, minerals, types of soils, cocoons, egg masses, mounted butterflies and moths, *old* bird nests and deserted bee, wasp and hornet nests, herbarium material, or contribute from their own collections of preserved material. Adults could collect and contribute interesting twigs, branches and leaves; plant life not protected by law; fungi, mosses and lichens; suitable small animal life to be sent in proper containers; salamanders, frogs and snakes, also properly packed.

This material, which will be carefully distributed through the schools, may be sent to Mr. Harvey Wilde, president of the New York chapter of the American Nature Study Society, 121 East 51st Street, New York City. Identify and label your material, if possible. Don't throw away any old collection you may have; send it where it will help children who have little or no opportunity for Nature experience.

Botanical Courses

Residents of New York and vicinity are fortunate in being able to attend a variety of courses offered by the New York Botanical Garden, Bronx Park, New York. These courses are offered at a nominal fee and cover the fundamentals of planning, planting and caring for gardens. The Garden has added a half dozen new courses.

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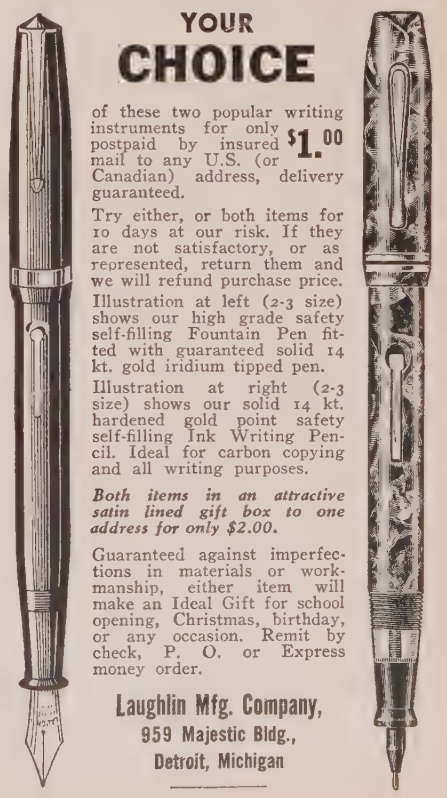
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THE SCHOOL PAGE ★★★

EDITED BY DR. E. LAURENCE PALMER

Professor of Rural Education, Cornell University, and Director of Nature Education, The American Nature Association

Fruits in School

A speaker in the University of Washington, some years ago, suggested that, according to the progressive education idea, an apple brought to school would be divided among the members of the class to satisfy a need for training in division; that it could be used to stimulate interest in geography and the location of the Wenatchee Valley; that its association with the Garden of Eden would bring in religious instruction, and its rôle as a target for William Tell would help in history. He said that when they got down to the core material in such a lesson some might feel like considering the whole thing apple sauce, and that the school might then adjourn and dance the Big Apple.

If we can see so many educational approaches through apples, how much can we get from the great variety of fruits that are available to us from the fruit store. The first outline in natural science published for use in elementary schools in America gave generous recognition to the prominence fruits might hold in the intellectual diet we might feed our children.

The special insert in this number of *Nature Magazine* is designed to suggest some of the ways in which fruits may be used in a school program. Since that insert was written there has been a phenomenal growth of interest in the nutritional value of fruits, which must be a part of an up-to-the-minute school program designed to help in national defence. The tabular material in the insert should assist in this.

Many elementary schools claim that their science programs should not recognize the barriers established by the biological and the physical sciences. Such schools would do well to look to fruits for introductory lessons bearing on chemicals. We find fruits varying greatly in taste because of chemical differences. Why cannot these differences be used to introduce the idea that things do differ chemically, and that taste provides one means of recognizing these differences? It should not be difficult—or unwise—while studying the tastes of different fruits, for the children to map their own tongues to see on which parts they can most readily identify things that are sweet and things that are sour. It may surprise them to find that the different parts of their tongues vary so greatly in this respect.

Those schools that feel the necessity of teaching something about bacteria in the elementary schools might remember that the interior of a vigorous edible fruit usually teems with nourishment on which the common air-borne bacteria may thrive, but that it is practically sterile of the bacteria. Here, then, is a splendid opportunity to show how abundant bacteria are on dirty toothbrushes, dirty knives and other unclean things. A series of sterilized jars may receive slices of bananas cut with a sterilized knife. One slice scratched with a toothbrush; another with a dirty knife and so on may show simply, conspicuously and cheaply that there are variations in the bacterial gardens these different things produce. The results may not be so conclusive as those from using the standard bacteriological equipment but they may be sufficient as introductory evidence.

Color changes in fruits are important to the man who markets them, and they provide good lessons that may be carried on in any school room. Color changes may indicate a bruise, the degree of decay, the degree of ripeness and other things. They may be accompanied by changes in taste, as anyone knows who has tasted green, mature, or decayed fruits. Here, then, may be some simple introductory lessons on the chemistry of things.

Take a clean, yellow banana. With the blunt end of a pencil scratch initials lightly on one side, merely making a slight impression that can scarcely be seen. Leave the banana to ripen and notice the effect of the bruise on the speed of ripening or of rotting in that particular area. Make a dark paper cylinder just large enough to enclose a fresh yellow banana. Cut some holes through the cylinder so that light may penetrate to the enclosed banana. Does the light-struck portion change color differently than the portion kept in the dark? From a "hand" of bananas remove one in such a way that the white interior lies exposed at the cut end. Remove another in such a way that the interior is not exposed. Which of the two bananas "keeps" the better? What does this tell you about removing bananas from the stalk when they are not to be eaten soon?

If one happens to dislike those who "Nature fake", read Henry Van Dyke's, "Little Red Tom" in his book, *Days Off*. This story was written by Van Dyke to ridicule the highly sentimental way in which some Nature stories have been written. It is worth reading no matter which side of the argument may hold your sympathies. It may be useful in helping you and your pupils to formulate a rational philosophy on "Nature faking" and its critics. Sometimes even the critics overplay their arguments.

Have the children make simple studies of the fruit preferences shown by different animals. A dog may reject a morsel that to us seems delicious, and relish a thing that we would naturally abhor. But how do chickadees, rabbits, chickens and cats differ in their choice of foods? Cut fruits up into small portions and offer these to the animals available to see how they are relished. A horse is a vegetarian. It will eat apples readily, but will it eat an orange with equal satisfaction? These studies may be carried on outside of school hours and may constitute a report over a relatively long period of time. The results will be surprising, particularly if attempts are made in advance to predict how the animals will react. For example, make a table showing a convenient list of fruits and opposite these names places to write "Yes" or "No" under the names of different animals. If the children think a horse will like oranges then the word "Yes" should appear opposite "orange" and under "horse". After the children have offered these foods to the different animals check the list of what happened with the list of what they thought would happen. Some surprising results may be had, and it may be just as well for the teacher to refrain in advance from making any predictions. It might be well too to point out that some individual animals of a kind may eat one kind of food while other animals of the same kind may reject it. Tastes may vary as with humans.

A can of "fruit cocktail" may make an interesting study to see to what extent each kind of fruit found in it may be identified first by looking at it and then by tasting it. The little cubes may be served on pieces of paper that bear numbers below each piece of fruit, and may be carried to the mouth conveniently in school by using tooth picks. The children may write their guesses as to what kind of fruit each piece is after the appropriate number and before it has been tested by tasting it. This will give a further experience in understanding how sweet and sour things taste differently on different parts of the tongue. If you do not believe there is such a difference, try to identify each piece of fruit in a can of fruit cocktail only by looking at it and tasting it with the extreme tip of the tongue, or by tasting it only with the back of the tongue. If you do not believe that what you see helps you determine what the taste of a thing may be, try identifying the pieces of fruit salad by being blindfolded and then being fed the pieces so that they touch but one part of the tongue. The results will surprise you.

If the school has the "collection" complex, a most interesting exhibit may be made of the seeds taken from common edible fruits to be found in the average fruit store. It may be easy to distinguish the seeds of tomatoes from seeds of oranges. But is it possible to distinguish the seeds of grape fruit from those of oranges or lemons with certainty? Are all grape seeds alike so far as you can see, and can you distinguish between the seeds of apples and pears? Do you find anything that looks like seeds in such fruits as bananas and pineapple, and if not do you think these reproduce by using some plant part other than their seeds? It is always interesting in school to plant a few of the seeds of plants whose fruits come from foreign lands. There will probably be a tremendous number of the seeds that do not grow at all, but if a child can see a young orange tree, or a sprouting date palm, or even a little peach tree that came from some seed he planted in a school room flower pot, he will have established some rational contact with the plants from foreign lands that supply him with fruits he enjoys. Little can be lost and much can be gained by planting a great variety of fruit seeds just to see what will happen when they break through the soil.

Of course any school room activity involves at some time the use of words. The names of fruits find common usage to indicate something other than the fruit itself. It is quite different to have someone call you a peach instead of calling you a prune, and yet the two plants producing these fruits are closely related. We speak of children being the "apples of our eyes", and other fruit names have common usage. Some teachers may welcome reports on the different connotations that may be given the names of all the fruits available for study. Thus the classroom possibilities of fruits are many.

MARTY DZIB

(Continued from page 464)

with the *cab cab,* the native Yucatan bee which, he says, does not sting. Neither does the *ehol,* another wild bee that builds its nest in the rocks and from which it is easy to procure honey. The little *xnuc-cab* is black and builds its nest in the sides of old houses. Marty suggests that it possibly gets its name from the fact that, like an old lady (also called *xnuc*), these bees stay rather close to their hives. They do not sting, but if you go after their honey, they will attack one's head and get completely entangled in one's hair.

"Most bees sting, and some sting very hard," our guide says. "The American bees and the Italian bees are '*muy bravo*' and they have terrible stings." Then there is the *holom,* which builds its nest in the door jambs of Maya houses, and the *balam-cab,* which builds its nest in the ground, will follow a person for more than twenty meters. A wild bee called *yaxich* has yellow eyes and has a habit of stealing honey from other bees. The *kankul,* which has a terrible sting, lives in holes made by woodpeckers and never makes much honey. The *uz-cab* is a small bee of the size of a gnat, stings and is capable of making a small amount of honey. There is the *xik,* a bee with a black body and white wings, that makes very white honey. The *muul* is a bee that makes its nest in the ground and produces honey, but the Maya do not gather it.

We wondered whether Marty might not be confusing bees with wasps, but his detailed description convinced us that he knows wasps also. He tells of the *isua-jil,* a wasp that always flies in doorways but never stings, and a very large wasp called *knal,* which builds a large nest but seems solitary since there are never more than two in a nest. The large *xanachaoc,* yellow in color, makes a nest like a long thin book, and the *xotoch lunul* builds its nest of mud. The *xux* stings severely and its larvae are eaten by the Maya.

Although he knows the individual species well, Marty does not seem to differentiate between beetles and bugs. He identifies *chinhas,* or bed bugs, and is well acquainted with the horrible *pic* bug, *Triatoma,* some of which are the main carriers of the protozoan that causes the fatal and widespread Chagas' disease. Marty knows the various weevils, which live in corn. He describes four kinds of ticks, five kinds of fleas, four flies, and two mosquitoes, many butterflies and moths, and several spiders.

On our return from the bush Marty sees several objects that call the spiritual world to his attention. He shows us a tarantula carrying its young and says that it is an ill omen, adding that the hooting owl, the green snake, the opossum, and over- and undersized eggs are all signs of misfortune to the Maya.

It is late in the afternoon when we return to the Piste Plaza, and on the way we meet several of Marty's friends, one of them Faustino Tun. Marty explains that Maya Indians give Spanish names to their children according to the day they were born. The parents consult the Catholic calendar and name the child accordingly. Nearly all of Piste's children are so named, but most of the surnames are definite Maya words, generally the names of natural objects. Thus, Faustino's name is Tun, which means precious stone. Names of other Maya families are Balam, or jaguar; Cab, or bee; Ek, or star; Mis, or cat; Pech, or tick. Marty adds that Faustino often wears patched clothes, and because of this he was nicknamed *x-pich* after a little bird by that name whose feathers are particularly ruffled. Amused by nicknames, Marty said that people who walk very fast are nicknamed *x bech,* which in Maya means "the quail"; those who talk a great deal are nicknamed *paap,* after a brown jay that seems to be jabbering constantly. Women who have many babies are called *curi,* after the guinea pig. A person with malaria is called an *och,* or an opossum, because a person with malaria can be deathly sick one day and perfectly well on the next, corresponding to the opossum's feigning death.

After leaving the plaza, we go directly to Marty's home, which is like all Maya homes. Fernanda is there with her children—Servano, Conchita and Paulino. At the suggestion of Marty, Fernanda prepares for us a bowl of foaming chocolate, the like of which is found only in Yucatan. While drinking the chocolate, I notice three gourds hanging in the doorway. "Why the gourds, Marty?" I ask. He says that Maya people believe that some sicknesses, generally those of an epidemic nature, such as whooping cough, are brought about by some of the spirits of the bush, and to prevent an epidemic, gourds of food are placed in the doorway for nine successive nights as an offering to these spirits, one for each child of the family.

Servano is busy with a buzzing beetle that his father has taught him to tie so that its wings will move rapidly while its body remains stationary. At our interest in the boy's activity, Marty tells of an amusement in which the Maya adults sometime engage. First one finds a large cockroach, which, in Yucatan, ranges in size from two to three inches in length. On its thorax the Maya place a small candle. When lighted this causes the frightened cockroach to run madly about, apparently amusing the onlookers.

There seems no end to the items and observations of natural history that Marty can relate. Because of this volume of information, we ask him if he is an exception among his townspeople regarding such knowledge. Without hesitation he assures us that the things he has told us are common knowledge among the Maya. In broken English he says, "Every Maya people knows." He goes on to say that his friend, Gregorio, can tell Maya stories all day about the birds, animals and trees, and that Eldiberto knows much more about animal habits than he does, and can construct excellent traps to catch them. Genaro is a real specialist on plants and trees. But such general knowledge as he has told us—"Every Maya people knows."

Boston Terrier

The Boston Terrier. By Vincent G. Perry. Chicago. Judy Publishing Company. 1941. 160 pages. Illustrated. $2.00.

This is a second edition of this authoritative work on this breed. The Boston is considered historically, from the show point of view, its breeding, feeding, care and training. It is a practical book for dog owners, particularly, of course, owners of this kind of canine.

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NATURE IN PRINT

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(Continued from page 427)

brief, it is the mountain itself and all that pertains to it which he discusses. "A mountain like Lookout," he testifies, "holds something magnetic about its personality which is worthy of heralding abroad."

Certainly no mountain could wish for a better herald. Not content with matter-of-fact descriptions alone, Mr. Walker has interspersed his prose with many of his sonnets and other verses, which by themselves make the volume one of value. *Lookout* proves to be an individualistic sort of book, in fact, and will undoubtedly prove pleasing to readers in various ways, and inspiring too, for, as Mr. Walker says: "At the mention of the word 'Mountain', immediately the human mind begins forming great ideas . . . the magical quickening of the soul to great and noble achievements cannot be stilled." And he has done far more than mention the word.

Hormones and Such

Plant Growth-Substances. By Hugh Nicol. New York. The Chemical Publishing Company. 1941. 148 pages. $2.00.

This is the second edition of this book, which is devoted to the chemistry and applications of these plant growth-substances and which pays special attention to synthetics. This is a field of research that changes rapidly these days, and this volume is intended for specialists and students and not the layman.

Drawing Horses

How to Draw Horses. By John Skeaping. New York. The Studio. 1941. 64 pages. Illustrations. $1.00.

One in a series of practical books on drawing, the others being devoted to cats, birds, dogs, trees and airplanes.

Science Guide

Marine Food and Game Fishes of California. By L. Ernest Herz. Sacramento. California State Department of Education. 90 pages. Illustrated. Free to California schools; 25 cents otherwise.

The title of this booklet, which is one in the series of Science Guides for Elementary Schools, is descriptive of its contents. The text is popular and combines facts on the biological and economic importance of the marine fishes of the waters of California.

Flower Album

The Flower Family Album. By Helen Field Fischer and Gretchen Harshbarger. Minneapolis. The University of Minnesota Press. 1941. 130 pages. Illustrated. $2.50.

Originally published in planographed form by the authors, the acceptance of this interesting treatment of 458 flowers, vegetables and weeds has been so enthusiastic that it has been brought out in more elaborate dress at no increase in the original price. It is a novel and effective introduction to the members of the garden family.

Forest and Farm

Forestry in Farm Management. By R. H. Westveld and Ralph H. Peck. New York. John Wiley and Sons. 1941. 339 pages. Illustrated. $3.00.

The title of this book is descriptive of its contents, which deal with the important question of the forest on the farm and as a part of wise farm management. There are proper and improper uses of the farm woodland. Such areas may be a tremendous asset to the farmer as conservers of soil and water and as contributors to the farm income. The authors show how to get the most out of the farm forest.

History of Science

A Short History of Science. By W. T. Sedgwick and H. W. Tyler, revised by H. W. Tyler and R. P. Bigelow. New York. The Macmillan Company. 1939. 512 pages, with illustrations and index. $3.75.

This is in part a revision of the 1917 edition of Sedgwick and Tyler's book by the same name, but is, in fact, to a great extent new. The earlier work was the outgrowth of a course of lectures at the Massachusetts Institute of Technology, and this new edition stems from the same source. Dr. Bigelow has collaborated in place of the late Dr. Sedgwick.

Attracting Birds

The Audubon Guide to Attracting Birds. Edited by John H. Baker. New York. Doubleday, Doran and Company. 1941. 268 pages with index and illustration. $2.50.

The title of this book is thoroughly descriptive of its contents. It is the work of the National Audubon Society, with seven chapters by Roger Tory Peterson, two by Richard H. Pough and one by Dorothy A. Treat, all members of the staff. Mr. Baker, executive director, contributes two chapters and organized the material. The result is a practical and interesting book for anyone interested in luring bird visitors and making them feel at home at any time of the year.

How to Prune

Pruning Trees and Shrubs. By Ephraim Porter Felt. New York. Orange Judd. 1941. 238 pages. Illustrations. $2.00.

When to prune and when not to; how to do it with a variety of trees and shrubs, provide questions that the average home owner is not often able to answer. Dr. Felt provides the solution to these problems in this book, the title of which is thoroughly descriptive of its contents. There is also a chapter on tree repair, and one on the care of hedges.

Rubber

Rubber and Its Uses. By Harry L. Fisher. New York. The Chemical Publishing Company. 1941. 128 pages. Bibliography and index. $2.25.

By a distinguished chemist, this book is an interesting and valuable popular discussion of a product of Nature that has become a fundamental part of human economy today. Known to the native of tropical regions centuries ago, it made its first appearance in European writings in 1521. It was not, however, until the 19th century that its use became general and varied, and even then it was not until the discovery of vulcanization that the possibilities of rubber were truly realized. Today research and experiment have infinitely widened the significance of this product, but there is still much to be learned.

Butterflies

Butterflies. By Ralph W. Macy and Harold H. Shepard. Minneapolis. The University of Minnesota Press. 1941. 248 pages with figures, photographs and four color plates. $3.50.

This is a guide to all the butterfly species known to occur in that part of the United States and adjacent Canada lying east of Nebraska and the Dakotas, and as far south as the northern borders of Missouri, Kentucky and Virginia. Thus this book fills a gap left by the fact that Scudder's three-volume work on eastern butterflies has long been out of print. The authors have admirably achieved their objective of providing a key that will make accurate identification easy. This is a practical, useful and valuable book that should enjoy wide acceptance.

Child and Nature

How Miracles Abound. By Bertha Stevens. New York. John Day Company. 1941. 200 pages. Illustrated. $2.50.

The period in a child's life between the ages of seven and nine offers the golden opportunity for promoting some realization of Nature as a whole, the author says in this valuable and stimulating book. At that period children combine a spirit of childlike wondering with intelligence, and this makes study of Nature, or any part of it, particularly fraught with meaning. It becomes the responsibility of the adult, therefore, to bring these wonders of Nature—these keys that open the door to such fascinating material—to the attention of the child. Probably the majority are not equipped to do this in the most fruitful manner, and it is to supply such a deficiency that this book is written. It is not an organized Nature study text but it treats with such things as a star, a salt crystal, a lima bean, a petunia, a snail shell, a tree and a goldfish and shows the adult how these and some other specific things in Nature can inspire the young mind. It seems to us that this book should be required reading for every elementary school teacher; should be used by any individual working with youngsters outside the school; should be commended to the attention of every parent who has the intelligence to recognize his or her responsibility to nurture to the fullest the fertile mind of the child.

On Nature's Trail

We Follow the Western Trail. By Ruth Wheeler. New York. The Macmillan Company. 1941. 160 pages with photographs by H. D. Wheeler and the Author. $2.00.

Through the "great lesson book of Nature" the Creator speaks to us, writes Mrs. Wheeler in her foreword to this book that takes the lover of the outdoors on many different trails. Through this "lesson book", she writes: "We may discover anew many of the basic principles of life as we separate for a time from the pleasure-seeking, money-making, economic swirl of humanity. Amid the freshness of the high hills, the perfume of the spring-time, the world of trees, birds, butterflies, and flowers, we may learn lessons that will keep us in harmony and in touch with eternity. Where can we better learn the lessons of obedience, patience, peace, temperance, and trust than in the ways of the wilderness, which are the lingering traces of God's handiwork?"

Through these introductory words we obtain an idea of the philosophy that the author has woven into her entertaining, informing and inspiring story of following outdoor trails. She takes the reader by western seas, into the high country, along desert trails that seem to lead nowhere, to timberline and elsewhere. The pictures taken by Mrs. Wheeler and her husband, who have many Nature photographic triumphs to their credit, add to the charm of this book.

Genetics and Evolution

Genetics and The Origin of the Species. By Theodosius Dobzhansky. New York. Columbia University Press. 1941. 446 pages. $4.25.

The original edition of this book met with wide acclaim in the scientific world, and this reception warranted the preparation of a second edition. The present volume is an enlarged and revised discussion of the subjects indicated in the title, and is brought up to date through consideration of recent progress. Doubling of the bibliography between editions indicates the development of research and thought in this field. We have in this book a volume for the scientist, biologist and student, and an immensely valuable one.

About the Tern

A Behavior Study of the Common Tern. By Ralph S. Palmer. Boston. The Boston Society of Natural History. 1941. 136 pages. Plates.

This is a careful study of the common tern of special interest to bird students. The studies were conducted by the author in Maine, largely at the Sugarloaf Islands near Popham Beach, Sagadahoc County.

On Campcraft

Campcraft ABC's. By Catherine T. Hammett. New York. Published by the author at 684 Riverside Drive, New York City. 112 pages with drawings by Zelda Atkins. $1.00.

This is a very practical book on campcraft that should be immensely valuable to camp counselors and to individuals who either lead groups of campers or just camp. It covers equipment, tools, food, hiking, fire-building and many other details of such outdoor activity.

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OF THE MOUSE AND MEN

(Continued from page 441)

spots that could be watched from refuge headquarters. Yellow-headed blackbirds, Arkansas kingbirds, western meadowlarks, and flocks of Franklin's gulls were especially conspicuous to eastern eyes. We saw a beaver atop its marsh home, and at night our headlights dazzled the eyes of half a dozen deer. Refuge biologists have impressive lists of the species of birds and mammals on their areas, but it does not take a visitor long, even without such a list, to realize that he is in the midst of an abundance of wildlife.

The marshes of the Lower Souris Refuge had again become so famous that nationally-known photographers were coming to them just as the sportsmen came a generation ago. Refuge Manager Henry had eighteen blinds in readiness, most of them for waterfowl but some also on sharp-tailed-grouse and prairie-chicken grounds. Lorene Squire, who was there with her camera when we arrived, said that the Lower Souris Refuge was the best that she had yet found for her purpose. This valley of marshes was plainly a marvellous waterfowl nursery and a great wildlife sanctuary.

So also was the Upper Souris Refuge, especially its southern part, and the northern part we found to be the most delightful and interesting of all the areas we saw along the Mouse. For here we not only saw nesting waterfowl but saw them in a natural, wild, river setting. We were above the visible influence of the farthest upstream dam, and the river seemed more itself and less the means to a human end. It was true that even here the area was being managed to the best waterfowl advantage. Across some of the river loops, for instance, shallow ditches had been dug, making islands out of the former peninsulas, islands that were marshy for the ducks. We knew, of course, that all of the management in this current project of man on the Mouse was with the earnest purpose of working with natural forces intelligently. We admired the way in which man had made the river's marsh areas more extensive even than they had been in the good old days. It was very satisfying to know that those marshes were providing nesting places for ducks raising more than 200,000 young a year.

Yet we enjoyed most the view, in the northern part of the Upper Souris Refuge, of the sinuous, tree-marked course of the Mouse extending upstream in a "state of Nature" toward its source in Canada. We thought that the refuge was important not only because it included successful human developments for wildlife conservation but also because for many miles it has preserved the natural valley of the Mouse. We hoped that this latest adjustment of the partnership between man and the Mouse River would prove satisfactory to all concerned.

IT'S NOT CRICKET

(Continued from page 460)

are physically repulsive? At least I am trying to be honest in stating objections, which is more than I can say for those who present points, such as they are, in behalf of hunting.

Third, I object to hunting because it cannot truly be termed a sporting activity. If it were sporting, the animal would have an equal chance. The hunter answers this by saying that the animal's coloring is protective, that it moves faster and that it knows the country better. True, but the animal's only alternative is escape in order to save its life, which is a negative force in the combat, while the hunter has the alternative of destruction through the instrument of his gun, which is the vital, aggressive force. If the hunter feels that the animal has an equal chance, why does he not offer to change places with him and be the hunted instead of the hunter? My idea of something truly sporting is when opposing forces, which are equal in quantity and quality, voluntarily pit their skill, one against the other, in competitive endeavor, which does not require death or destruction as a means to an end. I have known dozens of hunters who get rabid when bullfights are spoken of as sporting events.

Perhaps I do not have the right to ask anyone to give up the hunting he enjoys, but I do have the right to make a plea for honesty. Marcus Aurelius gave the best prescription for honesty when he said, "Make for thyself a definition or description of the thing which is presented to thee, so as to see distinctly what kind of a thing it is, in its substance, in its nudity and in its complete entirety, and tell thyself its proper name, and the names of the things of which it has been compounded, and into which it will be resolved. For nothing is so productive of elevation of mind as to be able to examine methodically and truly every object which is presented to thee in life, and always to look at things so as to see at the same time what kind of universe that is, and what kind of use everything performs in it, and what value everything has with reference to the whole, and what with reference to man, who is a citizen of the highest city, of which all other cities are like families, what each thing is, and of what it is composed, and how long it is the nature of this thing to endure."

If "sportsmen" insist upon continuing the practice of hunting, at least they should be honest enough to recognize it for what it is—a process of killing for the sake of and pleasure of killing. They should not try to reassure themselves or justify this activity by calling it something that it is not—that is, sporting.

"BOUNTIFUL" AND "OLD HEAVY BERRY"

(Continued from page 433)

given away or sold. Bountiful, indeed!

Then there was "Old Heavy Berry", as the boys around Burlington, New Jersey, called it. Sturdy as an oak, it lived through much. Once its whole top was cut off. Its limbs were cut back to stubs, but it kept on growing. Mr. Dilatush fell in love with the holly a dozen years ago; coveted its heavy dark leaves and profuse berries. By persistence he finally wore its owner down and bought it.

"Bittersweet" is another much-treasured holly personality, with striking berries and heavy foliage. It is a favorite of the birds, too. "Merry Christmas" is a tree that was found and transplanted to the Catskills, but from which cuttings produce new trees as rich in foliage as the parent.

After one has met Mr. Dilatush and his hollies one can understand his enthusiasm for them. When he sells tomatoes, or corn, or pumpkins in his farm market he takes pride in the freshness and quality of the vegetables. When he sells his hollies he has the feeling of a missionary going out to do good in the world. He is happy that a beautiful tree is going to grow to carry on the holly line, adorn a home and delight the birds.

"Selling hollies is part of my business," he says, "but I'm most interested in having people plant holly. I don't care where they buy them. And I'll be glad to send anyone a booklet on hollies and how to care for them. Just Robbinsville, New Jersey, will reach me. And if other people love holly as much as I do, tell 'em to drop in when they're driving my way."

The World Calendar

What the adoption of the proposed "World Calendar" would mean to industry, labor, government, law, retailing, agriculture, finance, science, education, religion, the home and to everybody is effectively presented in a recent publication of The World Calendar Association, 630 Fifth Avenue, New York City. In this publication the arguments for this logical change are presented concisely, and wide circulation of this 32-page booklet should help to further this cause. Copies, we understand, are available on request. Informed Americans should acquaint themselves with this movement because it something the world will eventually adopt.

Conservation Conference

The National Conference on Conservation Education and Publicity will be held at Pickwick Dam, Tennessee, from September 27 to 29. The meeting will bring together men specializing in work indicated by the title of the organization. Discussion will be directed toward educational and publicity work through motion pictures, slides and film strips, through the press, through the schools, through various organizations and through publications.

Correspondents

John P. Craig, West Liberty, Ohio, wishes to be added to the list of those whose names we have printed from time to time as desiring to correspond and trade with others interested in herpetology. Also Miss Jean Thompson, 603 W. Lafayette St., Norristown, Pa., would like to correspond with others with a general Nature interest.

Forestry as Profession

Analysis of the profession of Forestry, its opportunities, the training necessary and where to obtain it, and its place in the professions and in the country's economy is presented in the eighth in a series of vocational and professional monographs published by the Bellman Publishing Company, 6 Park Street, Boston, Mass., at fifty cents. The author is Lewis C. Swain of the University of New Hampshire.

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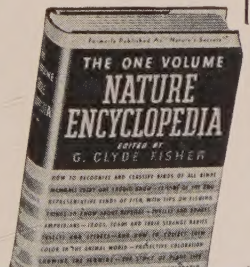

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Old Landmarks

Progress—or what we like to term progress—is often too prone to forget and destroy the foundations upon which it is built. This thought was brought forcibly to our attention recently when we came upon a group of etchings of integral parts of America's past. These are the work of Herman C. Lammers, who has produced a series of twelve studies of the American scene that has gone, or nearly gone. They include such subjects as the covered bridge, the country store, the old oaken bucket, the canal boat, the grist mill, the toll gate, the cigar store Indian, the scissors grinder and the old watering trough. These are nostalgic reminders of things and scenes that may well be remembered in these changing times.

Garden Philosophy

By Light of Sun. By Elsie Symington. New York. G. P. Putnam's Sons. 1941. 196 pages, with woodcuts by Clare Leighton. $2.00.

This is a garden book that is not a garden book in the usual sense of the word. It is, rather, the story of gardens that provided a way of life; a philosophy of existence. The author has been the custodian of several gardens, and from them has drawn inspiration. This she has transferred to the printed page in an informal and delightful little book that will charm any lover of gardens.

How We Work

The Body Functions. By Ralph W. Gerard. New York. John Wiley and Sons. 1941. 290 pages, with illustrations. $2.25.

This book is one in the series of survey courses for colleges in the sciences edited by Gerald Wendt. It does not appear, however, to be limited purely to class purposes since the treatment is sufficiently popular to be of interest to anyone who wishes to find out what makes us tick, physically. As the author says, it is a look under the hood of the human machine, a contraption that is rather complicated and delicate and that requires the attention of expert mechanics. At the same time, it is not a bad idea to have some notion of the human mechanics ourselves so that we will not race our motors and otherwise abuse our personal mechanism.

Beach Plum Prizes

Anyone who has known Cape Cod—as we have—knows beach plums and their special delights. We were interested to learn recently of prizes offered by Arnold Arboretum of Harvard University for the improvement of the beach plum or for efforts in its behalf. One is the James R. Jewett prize, and an award of $100 went to Mrs. Wilfred O. White of Boston and Vineyard Haven, who has urged the cause of the beach plum even to the extent of leading the fight for passage of a bill in the Massachusetts Legislature for funds for experimental work with it. The Vieno T. Johnson prize of $50 went to Mrs. Ina Snow of Truro, Massachusetts, for her own field work and records and articles on the beach plum. These prizes will be awarded annually.

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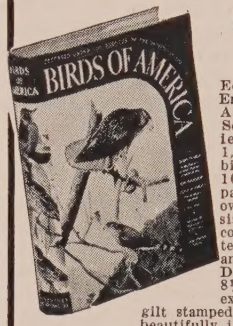

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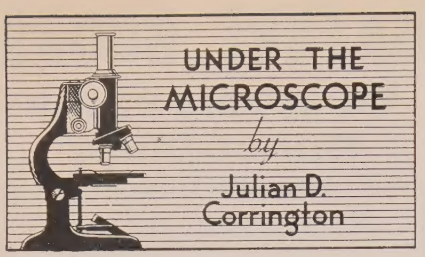


Stars of the Sea

If asked to name one of the most characteristic and striking animals of the seashore, probably most persons would say the starfish, whether or not they had ever visited a coast or seen a living specimen. Entirely different from all other kinds of animals, members of the Phylum Echinodermata, to which the starfish belongs, comprise the only exclusively marine assemblage in the animal kingdom and have occurred in all temperate and tropical seas since the earliest geologic period.

The starfish is nothing at all like a fish, but the word is so well established that efforts to supplant it by the more appropriate name, sea star, have met with little success. So, too, with the terms jellyfish and cuttlefish—all creatures were fish that came to the nets of primitive sea folk. However, we shall back up the worthy effort to establish the better phrase, through usage, and call these echinoderms sea stars.

Most sea stars, Class Asteroidea (star-like), are flattened from top to bottom, the body being made up of a central disk and five radiating arms; the arms are not sharply marked off from the central disk, a character that separates the sea stars from their nearest relatives, the brittlestars or serpent stars, Class Ophiuroidea (snake-tail-like). Some sea stars have more than five arms, generally multiples of five. The sea urchins, heart urchins, and cake urchins or sand dollars, Class Echinoidea (hedgehog-like), have a globular or flattened test (shell) without arms, while the sea cucumbers, Class Holothuroidea (polyp-like), are elongate, sac-like, and bear little resemblance superficially to other members of the phylum. See the educational insert in NATURE MAGAZINE for February, 1940, for illustrations and descriptions of these four classes. Sea lilies, Class Crinoidea (lily-like), are stalked forms dredged from ocean depths, although in the species known as feather stars, the adults break off from their stems and become free-swimming. Only a few kinds of sea lilies are still living, remnants of a great extinct fauna, and related to several other classes of the phylum that are wholly extinct, such as the blastoids and cystoids.

On dissecting a sea star one encounters a large body cavity or coelom, with a pair of digestive glands in each arm accounting for most of the room thus provided. The mouth is situated in the center of the oral or ventral surface and communicates with a central stomach, from which radiate the digestive glands. A short rectum leads upward to the minute anus in the center of the upper or aboral surface. Among numerous unique habits, sea stars may protrude the stomach through the mouth, turning it inside out and wrapping it around an oyster or other victim, digesting the prey, then withdrawing the stomach to the interior again.

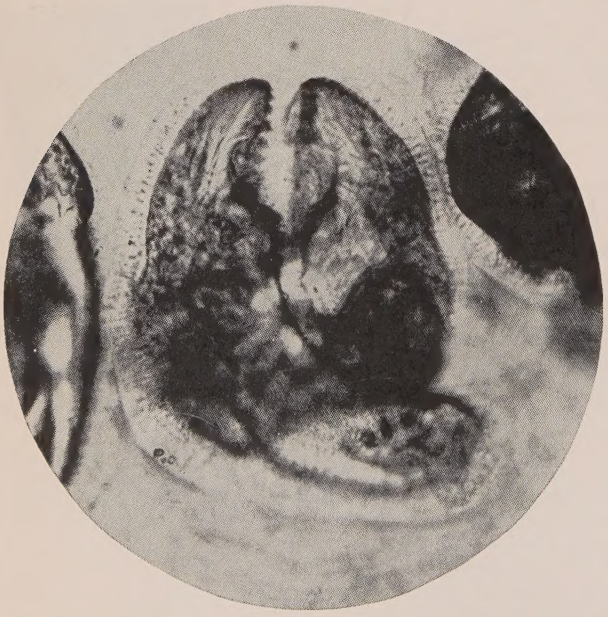
Respiration goes on through the body wall in small areas where this wall is very thin and pushed out to form finger-like projections—the skin-gills. Excretion also takes place through the body wall; a blood system is not present, and the nervous system and sense organs are poorly developed. The soft parts are encased in calcareous plates joined together by connective tissues that permit a certain amount of flexibility and movement, so that as the animal crawls about over rocks its shape conforms to irregular contours. At places over the body surface these plates produce spines, a character giving the name to the whole phylum—spiny-skinned.

Most highly organized of all parts is the water-vascular system, occurring nowhere else in the animal kingdom. Water is forced by ciliary action through a series of canals into a large number of tube-feet, arranged in pairs along the under side of each arm. These are extended by water pressure and contract by muscular action, meanwhile attaching by suction cups to the surface over which the sea star is creeping. The pull of a single tube-foot is slight, yet the combined action of many of them exerts a powerful force, ample to permit movement or to pull open the shells of clams and oysters.

Noteworthy among structures peculiar to echinoderms are the pedicellariae, minute nippers that lie about the base of spines or among skin-gills and serve to keep off encrusting organisms. These make most interesting whole mounts and may be obtained by boiling a piece of the skin from the upper surface of a preserved sea star for five minutes in 5% caustic soda, then isolating several pedicellariae, washing them well in water, staining with an aqueous eosin or fast green until well tinted, treating for a few minutes in 50% alcohol slightly acidulated with glacial acetic acid, washing in fresh 50% alcohol, then dehydrating, clearing, and mounting in balsam.

The only other slide preparation commonly made from adult sea stars is a cross-section of one of the arms. Since the viscera extend into the arms in this class, such a section makes clear the details of sea star architecture. In our illustration of this sort of slide the large coelom is conspicuous as the central cavity, separated from the exterior by an exceedingly thin wall at several places where this wall is pushed out to form skin-gills. The calcareous plates and their extensions, the spines, make up most of the body wall, while from the bottom, on each side of the center, three out of a row of four tube-feet lie in the plane of section, that of the outer right series being completely included. Dark structures in the roof of the coelom are the digestive glands. A pedicellaria shows at the left of the truncated spine at ten o'clock.

Sections such as this are not easy to make, since the calcareous plates and spines necessitate decalcification. An arm is first severed from a formalin-preserved or fresh specimen and a short section of it fixed in any of the regulation fixers, as Bouin's or Zenker's. Wash the piece well, then place it in nitric decalcifier. This reagent consists of 10 parts nitric acid to 90 of 70% alcohol. Use a



PHOTOGRAPH OF THE PEDICELLARIA OF A SEA STAR. MAGNIFIED ABOUT 200 TIMES

VARIOUS STAGES IN THE EARLY DEVELOPMENT OF A SEA URCHIN. MAGNIFIED ABOUT 75 TIMES

A CROSS-SECTION OF THE ARM OF A SEA STAR. MAGNIFIED 25 TIMES

large volume of the fluid and change it to fresh every day for an average time of 10 days. Decalcification is completed when a needle will insert readily in one of the large spines. Perform this test on a part of the arm that is not to be sectioned. Wash the decalcified tissue in a number of changes of 70% alcohol over a period of 24 hours, to get rid of all traces of the acid, then proceed to dehydrate, clear and section by the paraffin method as for any organ. For those properly equipped to use them, the freezing or celloidin sectioning techniques will yield superior results.

Sea stars have been widely employed in studying the early stages of embryology. Adult animals kept in tanks of sea water will discharge clouds of sperms or eggs to the exterior, or the gonads may be dissected out and the germ cells pipetted into a watch glass of sea water, effecting fertilization. All of the first steps in development may then be observed in the living condition and the material fixed at any time and prepared as whole mounts. Use Bouin's for 30 minutes as a fixer, and stain in alum cochineal, borax carmine or Delafield's hematoxylin.

The preferred type of slide is a composite mount showing several examples each of unfertilized (or uncleaved) egg, 2-, 4-, 8-, 16-celled stages of cleavage, later cleavages, blastula, gastrula and early larva. From a single dish of fertilized eggs, two or three of each stage are removed as they occur, fixed, washed, stained, and dehydrated to 82 or 95% alcohol and kept there until all stages have reached this step, then all are cleared and mounted together.

Recognition

On July 25 at Washington, Secretary of the Navy Frank Knox presented the Naval Ordnance Bureau flag to fourteen firms outstanding in performance in the National Defense Program. Each of the workers in these plants was awarded the right to wear the coveted Navy "E" insignia, symbol of excellence and the Navy's way of saying "well done."

Among the fourteen, the Bausch & Lomb Optical Company, of Rochester, New York, was conspicuous and received many commendations for the speed and zeal with which they have achieved a miracle of service. Admiral W. H. P. Blandy, chief of the Ordnance Bureau, pointed out that 85% of B & L instrumental output is now devoted to defense, including the huge rangefinders for battleships, other fire control instruments, lenses, binoculars, and many other optical devices. Mechanized warfare has placed a premium on this type of ordnance, it was explained.

President M. Herbert Eisenhart, vice-president Carl S. Hallauer, and others flew to Washington for the ceremonies of presentation, which took place in Secretary Knox's office, and later to attend a luncheon at the Willard Hotel. Plans were immediately laid to telegraph personal congratulations to each of the 7000 B & L employees and to have manufactured for them the lapel buttons they will wear in testimony of their award of the "E".

Upon returning to Rochester the delegation was met at the airport by a group of civic leaders and a week later a public celebration took place at the Red Wing Stadium, with all B & L employees as honor guests. The entire city was proud of this great firm and considered the honor as applying to all Rochester.

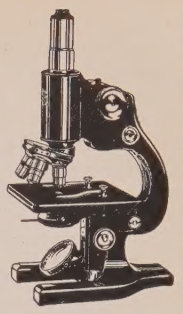
Beginner's Primer

Passing over several minor Orders of rare or little known insects, our survey would normally arrive, by the present installment, at the Order Mallophaga, the Bird Lice, also known as Biting Lice or Chewing Lice. However, the group is so important in general microscopy that we plan to devote a feature article to these weird little insects during the coming year, and so will pass them by at present with a mere listing.

The same statements apply also to the two following Orders, the Thysanoptera or Thrips, and the Anoplura, known as True Lice, Mammal Lice or Sucking Lice.

Accordingly we turn next to a very large assemblage, the Order Hemiptera, or Bugs. While the designation "bug" is quite loosely applied by the public to almost any form of insect, such usage is incorrect and only members of the Hemiptera should be so styled. Potato "Bug" is a case in point, the species being in fact a beetle.

It's a SPENCER!



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Hemiptera means half-wing, in allusion to the structure of the forewings, which are leathery or thickened over their basal half and membraneous or thinner in their outer or terminal half. In beetles, the first pair of wings are greatly thickened and hardened, being horny, veinless wing-covers, known as elytra. Hence the term *hemelytra* (hemi-half) has often been applied to the forewings of bugs. The second pair in this group are membraneous and fold beneath the first pair, which overlap when at rest and protect the more delicate hind wings.

The mouth-parts are formed for piercing and sucking and consist of a slender, pointed *beak*, grooved on the dorsal surface to enclose the highly modified mandibles and maxillae, each of which is in the form of a long, fine bristle. The beak seeks out a suitable place to puncture and protects the bristles when not in use by enclosing them. The four bristles are protruded beyond the beak when tissue is to be punctured.

The metamorphosis is incomplete, as in grasshoppers, the young resembling the adult save that wings are absent. After the first few molts of the nymph, wing-buds appear and grow larger with each successive molt, and increase in size very markedly after the last molt. Many species have no wings at all, while in others there are two forms, one with wings and the other without, as in the Water-Striders.

Many Hemiptera secrete ill-smelling fluids as a measure of protection, so they might be termed the skunks of the insect world. This is notably true of members of the Stink-Bug family and the Bedbug. As a matter of interest it may be noted that the term bug in England always specifies the Bedbug, and is not to be uttered in polite society. And as a matter of caution to the collector, let him be warned that the bristles of many forms of bugs are capable of inflicting painful stabs, so that most bugs must be handled with due regard for one's fingers; especially is this true of the well-named Assassin-Bugs and of most aquatic species. The following are some of the more important families, examples of which anyone may collect with ease.

Corixidae, the Water-Boatmen. Torpedo-shaped bugs averaging a bit under half-an-inch in length, found swimming with the dorsal (back) surface up, as is normal for animals, in all forms of fresh water—lakes, ponds and streams, still or running water. Hind legs long, oar-like and fringed with hair for swimming, which is done with a rowing motion. This leg makes an excellent

microscope slide whole mount as representing the aquatic or swimming modification. Middle legs long, thin and ending in two claws by which the boatman holds himself fast to some object near the bottom. Sometimes they float on the surface and if pressed can leap into the air and fly away. Food habits, omnivorous; mostly vegetation, but including minute forms of animal life as well. As seen in the water these insects glisten because of a film of air with which they are surrounded and which they breathe. Eggs and adults ground to a flour as food for birds and fish, and for human consumption in Mexico. Not economically harmful.

Notonectidae, the Back-Swimmers. Small aquatic bugs seen floating on the surface on their backs, which are keeled like a boat. The hind end protrudes slightly above the surface for air-breathing, done by drawing air into a pair of grooves along the ventral surface, arched over by hairs so as to convert the grooves into tubes. When disturbed they dart rapidly away and downward, rowing with the oar-like hind legs which, as in the previous group, make excellent mounts for the microscope. Collect with caution; stabs painful. No economic importance.

Nepidae, the Water-Scorpions. Aquatic, with two long caudal (tail) filaments that can be placed together to make a breathing tube. Commonly seen hanging downward with the end of the tube protruding. Large bugs with very long and slender legs, reminding one of a Walking-Stick insect. First pair of legs raptorial, i.e., adapted to seize prey; food habits carnivorous. Beneficial, since they destroy other insects.

Belostomatidae, the Giant Water-Bugs. Body wide and flat, like a large cockroach; forelegs raptorial; others for swimming. The giant species are the largest of all bugs and have been called "electric light bugs" since they are often attracted by such lights in considerable numbers when flying from one pond to another. Smaller species have the curious habit of the male carrying the eggs on his back. Collect with care; stabs very painful. No economic value.

Gerridae, the Water-Striders. Medium-sized aquatic bugs, with an elongate body and very long and widespread legs with which they float or move about upon the surface of waters. Certain species even occur on the ocean, far from land. Every one has seen these characteristic insects, known throughout Latin America as "Jesus Bugs." They congregate in little schools and maintain their position against currents in apparently effortless fashion. Predacious, attacking other insects; hence beneficial to man. Adults hibernate in winter. Collect with care; stabs painful.

This concludes the chief aquatic families. In our next chapter we plan to discuss the main terrestrial groups.

Trade Notes

Dr. Elbert C. Cole, Professor of Biology at Williams College, has produced a new histology that is certain to interest many of our readers. It is relatively brief and condensed, is comparative for the whole animal kingdom, contains a large number of illustrations, mostly photomicrographic and new, and has the best short account of the microscope and microtechnique we have seen, including numerous schedules of work and all of the modern methods.

The *Textbook of Comparative Histology* presupposes some knowledge of zoology and anatomy and is not for the beginner without such background. It is not an exhaustive reference volume wherein all known details of every tissue or organ can be found. But for a comparative work on all groups from protozoa to man, and for main essentials well explained, we can recommend this book highly. Pp. vii, 396; figs. 297. The Blakiston Co., 1012 Walnut St., Philadelphia. $4.00.

One of the best-organized, capably- and interestingly-presented, and well-illustrated texts we have seen in some while is the *General Bacteriology* of Professor D. B. Swingle. Superlatives become commonplace in book reviews, but we mean just what we say here. The author knows how to write entertainingly, yet shows complete mastery of subject matter. Bacteria are presented as living organisms and their biology fully covered, then later chapters are ecological and finally economic. An excellent book that will meet the needs of the average student as well as the layman who wants to know something about this most important modern science. Pp. xii, 313; figs. 157. D. van Nostrand Co., Inc., 250 Fourth Ave., New York City. $3.00.

In our own course of histology we have been using this past year Karl A. Stiles' *Handbook of Microscopic Characteristics of Tissues and Organs* with marked success. A small volume of ix—148 pages, fabrikoid cover and spiral binding, it is excellent to supplement the text and assist the student in identification, stressing the important and differential features of every tissue and organ. Succinct and outline statements sum up the chief points in texts, and there are a number of skillfully worked out charts with such titles as "summary of the histology of the digestive system." Different sizes and styles of type have been employed to stress relative importances. The Blakiston Company, 1012 Walnut St., Philadelphia. $1.50.

Making illustrations for scientific publications has become a splendid and most interesting profession in our times and can be suggested for serious consideration by those with artistic ability. If you are already engaged in this work or if you would like to find out something about its nature and requirements, we recommend *Scientific Illustration* by John L. Ridgway, of the Carnegie Institute of Technology and Carnegie Institution of Washington, formerly chief illustrator for the United States Geological Survey.

This handsome volume is not intended for beginners or as a manual of instruction on learning to draw; rather it is for those who have already mastered at least the fundamentals of artistic technique and who may wish to apply their knowledge and skill to a specialized field. Among included topics are choosing suitable specimens and the best methods for reproduction of each; how to pose materials and arrange plates; how to prepare copy for the engraver; the making and lettering of photographs, drawings, paintings, diagrams, graphs, charts, and maps and how each of these is reproduced in the publishing process. This is a very practical work by a distinguished author, beautifully illustrated. Pp. xiv, 173; plts. XXII, figs. 23. Stanford Univ. Press, Stanford University, Calif. $4.00.

Popular science is one of the more difficult forms of writing. The professional scientist who can speak with authority generally is unwilling to do so in language having popular appeal or is unskilled at this form of composition; the professional journalist seldom has sufficient training to cope with scientific problems authoritatively. Occasionally a writer has the necessary qualifications from both schools and becomes one of that small and badly-needed group who interpret science to the public—not to the "masses" necessarily, but to that educated and intelligent public who can be interested in something above jazz and cosmetics and can read words of more than one syllable.

Such a writer is Dr. Frank Thone, of *Science Service,* and such a book is *The Microscopic World,* a descriptive and photographic trip through microland. Here are fascinating accounts of bacteria, algae, diatoms, fungi, protozoa, hydra and certain other minute invertebrates. The reading matter is not confined to the older "revelations of the microscope" sort of thing—no more than natural history—but takes one upon excursions into many departments of modern science. How bacteria were discovered; their structure, physiology, classification and reproduction; where they occur and how they are captured, cultured, stored, inoculated or destroyed; valuable soil bacteria as well as deadly pathogens; uses of bacteria in agriculture and industry; the newest discoveries and research methods in bacteriology—all told in lively accounts understandable by anyone who can read a newspaper. Similar treatment is accorded the other groups of microorganisms.

The illustrations, as reproduced, are good, bad, and indifferent, but mostly they are adequate for the purpose. Dr. George Roemmert and his Microvivarium, the American, Buffalo and Rochester museums, Army Medical Museum, U. S. Dept. of Agriculture and many other sources have been called upon for photographs of apparatus and methods or photomicrographs of organisms. The volume is a popular yet scientific account, but not a textbook or reference manual. We recommend it highly to all beginners, amateurs, teachers and students, and as a handsome gift book for the relative or friend with scientific interests. Pp. 245, figs. 145. Julian Messner, Inc., 8 West 40th St., N. Y. $3.00.

Instead of offering a new booklet this month, we feel that the summer may have caused some readers to overlook the recently-offered Hartman-Leddon catalog of reagent specialties and the unique Color Chart for the Harleco Universal Indicator. Either or both of these should be in the microscopist's library and each is available for a three-cent stamp to cover mailing costs. For fuller details about these offerings refer to this department in the March and the June-July issues. A limited supply of some of the earlier offering is still on hand. Leaf back through previous issues and see whether you have missed any booklet you now want.